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NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, TENNESSEE. --ETC(U)
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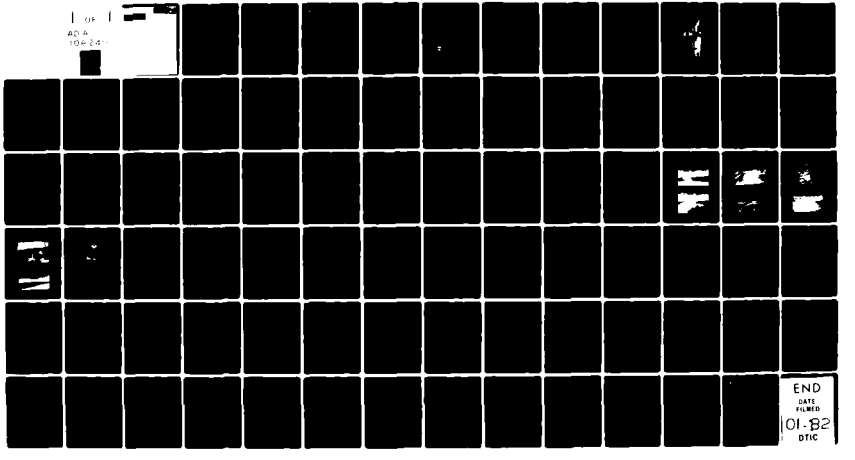

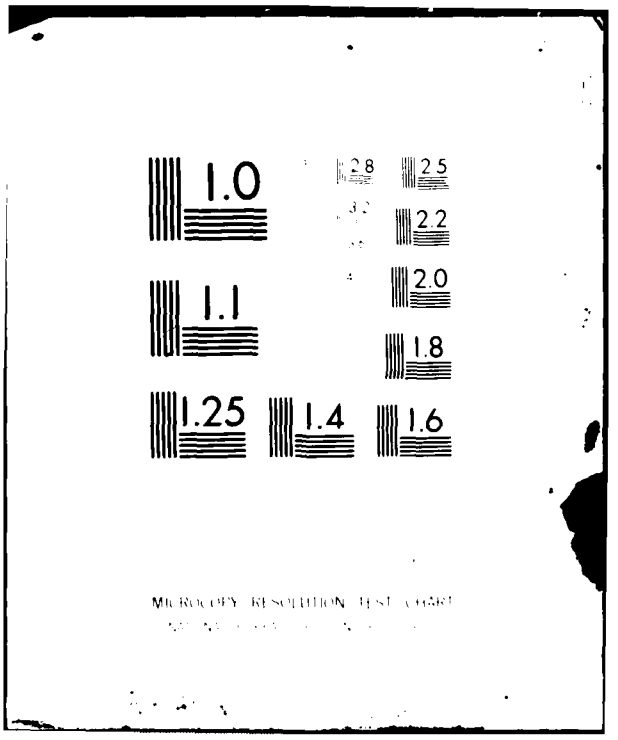
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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A108240	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) National Program of Inspection of Non-Federal Dams, Tennessee. Reed Lake Dam No. 1 (Inventory Number TN 16706) near Millington, TN, Tipton County, TN, Loosahatchie River Basin	5. TYPE OF REPORT & PERIOD COVERED Phase 1 Investigation Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s) DACW-62-81-C-0056
9. PERFORMING ORGANIZATION NAME AND ADDRESS Winsett-Simonds, Consterdine & Associates, Inc. P.O. Box 40045 Memphis, Tennessee 38104	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, Nashville P.O. Box 1070 Nashville, TN 37202	12. REPORT DATE September, 1981 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Tennessee Department of Conservation Division of Water Resources 4721 Trousdale Drive Nashville, TN 37220	15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited	
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)	
18. SUPPLEMENTARY NOTES	
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams, Dam Safety, National Dam Safety Program, Reed Lake Dam No. 1, TN, Millington, TN, Tipton County, TN, Embankments, Visual Inspection, Structural Analysis	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Reed Lake Dam No.1 has a 10.1 acre lake and is located in Tipton County, Tennessee one mile north of the Shelby County line and one mile west of Highway 51, and is an earth fill embankment 16.5 feet high and 530 feet long with a crest width of 14 feet. Facilities for discharge from the reservoir are a concrete service spillway, 6.8 feet high with inside dimensions of 2.1 feet by 2.7 feet and a 15 inch concrete barrel, and an emergency spillway in a natural draw located on the west abutment of the dam. The natural draw has a bottom width of 33 feet and side slopes of 1V on 31H and 1V on 21H. The embankment	

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

slopes are 1V on 1.2H on the upstream slope and 1V on 3H on the downstream slope. Both slopes have some undesirable vegetation. The dam is in the small size category and has a downstream hazard potential classification of high by the Corps of Engineers and of I by the State of Tennessee. On the basis of hydraulic analysis, Reek Lake Dam flood storage (33 ac-ft) and spillways are inadequate to safely pass the 1/2 Probable Maximum Flood (PMF), which Office of the Chief of Engineers (O.C.E.) Guidelines specify to be the design flood for a dam in the small size and high hazard categories. Reed Lake Dam No. 1 is considered "Unsafe-Non-emergency". It is recommended that a qualified engineer be engaged to: Recommend project modifications that will allow the emergency spillway to safely pass the design flood; investigate source of water found in auger hole at toe of downstream slope; recommend methods to stop erosion on the upstream slope and correct other undesirable conditions on slope; determine condition of riser and barrel, and recommend modifications to protect the riser from debris; evaluate stability of dam with earthquake loadings; develop a regular program of inspection and maintenance; and develop an emergency action plan to alert downstream residents in the event a major problem develops with Reed Lake Dam No. 1.

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

IN REPLY REFER TO
ORNED-G

2 SEP 1981

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

Furnished herewith is the Phase I Investigation Report on Reed Lake Dam No. 1 near Millington, Tennessee. The report was prepared under the authority and provisions of PL 92-367, the National Dam Inspection Act, dated 8 August 1972.

The report presents details of the field inspection, background information, technical analyses, findings, and recommendations for improving the condition of the dam.

Based upon the inspection and subsequent evaluation, Reed Lake Dam No. 1 is classified as unsafe-nonemergency due to insufficient storage and spillway capacity to safely pass the design flood and also questionable stability of the upstream slope.

We do not consider this an emergency situation at this time, but the recommendation concerning project modifications to allow safe passage of the design flood and others contained in this report should be undertaken in the near future.

Public release of the report and initiation of public statements fall within your prerogative. However, under provisions of the Freedom of Information Act, the Corps of Engineers is required to respond fully to inquiries on information contained in the report and to make it accessible for review on request.

Your assistance in keeping me informed of any further developments will be appreciated.

Sincerely,

LEE W. TUCKER
Colonel, Corps of Engineers
Commander

1 Incl
As stated

CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220

PHASE I INSPECTION

REED LAKE DAM NO. 1

TIPTON COUNTY, TENNESSEE

Prepared By:

WINSETT-SIMMONDS, CONSTERDINE & ASSOCIATES, INC.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TENNESSEE

Name of Dam	Reed Lake Dam No. 1
County	Tipton
Stream	Tributary North Fork Creek
Date of Inspection	April 7, 1981

This investigation and evaluation report was prepared for the Tennessee Department of Conservation, Division of Water Resources by Winsett-Simmonds, Consterdine & Associates, Inc., P.O. Box 40045, Memphis, TN 38104.

Prepared By:

Wm. E. Bush, P.E., Director
Civil & Water Resources Engineering

ABSTRACT

Reed Lake Dam No. 1 has a 10.1 acre lake and is located in Tipton County, Tennessee one mile north of the Shelby County line and one mile west of Highway 51, and is an earth fill embankment 16.5 feet high and 530 feet long. The crest width is 14 feet. Facilities for discharge from the reservoir are a concrete service spillway, 6.8 feet high with inside dimensions of 2.1 feet by 2.7 feet and a 15 inch concrete barrel, and an emergency spillway in a natural draw located on the west abutment of the dam. The natural draw has a bottom width of 33 feet and side slopes of 1V on 31H and 1V on 21H.

The embankment slopes are 1V on 1.2H on the upstream slope and 1V on 3H on the downstream slope. Both the upstream and downstream slopes have some undesirable vegetation.

Reed Lake Dam No. 1 is in the small size category and has a downstream hazard potential classification of high by the Corps of Engineers and of I by the State of Tennessee.

On the basis of hydraulic analysis, Reed Lake Dam flood storage (33 ac-ft) and spillways are inadequate to safely pass the ½ Probable Maximum Flood (PMF), which Office of the Chief of Engineers (O.C.E.) Guidelines specify to be the design flood for a dam in the small size and high hazard categories.

At this time, Reed Lake Dam No. 1 is considered "Unsafe-Non-emergency". It is recommended that a qualified engineer be engaged to: Recommend project modifications that will allow the emergency spillway to safely pass the design flood; investigate source of water found in auger hole at toe of downstream slope; recommend methods to stop erosion on the upstream slope and correct other undesirable conditions on slope; determine condition of riser and barrel, and recommend modifications to protect the riser from debris; evaluate stability of dam with earthquake loadings; develop a regular program of inspection and maintenance; and develop an emergency action plan to alert downstream residents in the event a major problem develops with Reed Lake Dam No. 1.

TABLE OF CONTENTS

OVERVIEW PHOTO

PHASE I INSPECTION

REED LAKE DAM NO. 1

TIPTON COUNTY, TENNESSEE

SECTION 1 - GENERAL

1.1 Authority - The Phase I inspection of this dam was carried out under the authority of the Tennessee Code Annotated 70-2501 to 70-2530, "The Safe Dams Act of 1973", in cooperation with the Corps of Engineers under the authority of PL 92-367, "The National Dam Inspection Act".

1.2 Purpose and Scope - This report is prepared under guidance contained in Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams, for a Phase I investigation. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analysis involving topographic mapping, subsurface investigation, testing and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. Additional data or data furnished containing incorrect information could alter the findings of this report.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

1.3 Past Inspections - An inventory reconnaissance trip was made to Reed Lake Dam No. 2 by the Division of Water Resources, State of Tennessee. (See Appendix F).

1.4 Miscellaneous Details - On the day of the Phase I inspection, the weather was partly cloudy with an average temperature of 65 degrees and the wind was calm. The level of the lake was approximately six inches below the service spillway crest.

1.5 Inspection Team Members - Field inspection was made by the following Winsett-Simmonds, Consterdine & Associates, Inc. personnel:

William E. Bush, P.E.
Civil Engineer

Dr. Fred H. Kellogg, P.E.
Geotechnical Engineer

The team was accompanied by Messrs. George Moore and David Roe of the Tennessee Division of Water Resources.

SECTION 2 - PROJECT DESCRIPTION

2.1 Location - Reed Lake Dam No. 1 is located in Tipton County, Tennessee one mile north of the Shelby County line and one mile west of Highway 51. It can be located on USGS Map, "Munford", at longitude 89°51'45" and latitude 35°24'25".

2.2 Description

2.2.1 Embankment - The Reed Lake Dam No. 1 is an earth embankment dam with a northwest-southeast orientation, a maximum height of 16.5 feet, and a length of 530 feet. The crest width is 14 feet. The upstream slope averages 1V on 1.2H from the water line to the top of the dam. The downstream slope averages 1V on 3.0H. The dam site is located in an area of loess hills near Kerrville. The soils and fill are clayey silts (Class "ML" in the Unified Classification System) to silty clays ("CL" in the Unified System). The underlying terrace gravels do not appear to affect the dam. Embankment sketches are provided in Exhibit B.

2.2.2 Service Spillway/Low Level Outlet - The service spillway has a concrete riser, 6.8 feet high with inside dimensions of 2.1 feet by 2.7 feet. The outfall pipe through the dam is a 15 inch concrete pipe. There is no antivortex baffle on the riser.

2.2.3 Emergency Spillway - The emergency spillway is a natural draw located on the west abutment of the dam, with a bottom width of 33 feet and side slopes of 1V on 31H and 1V on 21H. The maximum

depth is 1.0 feet and its maximum capacity at depth of 1.0 feet was calculated to be 140 cfs.

2.2.4 Reservoir and Drainage Area - The reservoir has a surface area of 10.1 acres at normal pool elevation with a fetch of 900 feet. The normal impounding capacity of the reservoir is estimated to be 37 acre-feet with an additional 33 acre-feet of flood storage. The drainage area is 121.2 acres and the predominant soil is Memphis silt loam.

2.2.5 Miscellaneous - The dam was built in 1952. The owner reported that some technical assistance was provided by the Tipton County SCS, but no plans or construction information were available. No failures, overtopping, or major repairs were reported. The lake is used for recreational purposes.

Reed Dam No. 1 is the third in a series of three impoundment reservoirs. Reed Dam No. 3 is the furthermost upstream dam and was built in 1946. Reed Dam No. 2 is the middle structure and was built in 1952.

SECTION 3 - INSPECTION FINDINGS

3.1 Specific Findings

3.1.1 Embankment

Geology - The dam site is located in an area of loess hills near Kerrville. The soils and fill are clayey silts (Class "ML" in the Unified Classification System) to silty clays ("CL" in the Unified System). The underlying terrace gravels do not appear to affect the dam.

Crest - Reed Lake Dam No. 1 is a crescent-shaped, compacted earth fill dam with a crest width of 14 feet. It has an east-west longitudinal alignment. The crest is used as an access road for this lake and two upper lakes in this system and is in generally good shape. Thin strips of roofing material are found in several sections of the crest to protect the crest from vehicular traffic. No longitudinal or transverse surface cracks were observed on the crest.

Upstream Slope - Water is about four feet below the crest. Below the water line, the slope has been terraced by wave wash. The slope is nearly vertical for a distance of one or two feet above the water line. Above this there has been a slight sloughing near the east abutment. The slope is covered with bushes for the first 75 feet west of the abutment. Farther west, there is constant sloughing one to two feet above water level. Erosion on this slope has been aggravated by

cattle tracks which have punched one to two inch deep tracks when the soil was wet and soft. Above the sloughed and wavecut section, the slopes are about 1V on 3H. There are numerous crayfish holes at the waters edge. A sloughed area about 150 feet west of the abutment has crayfish or boring animal holes just above it. About 250 feet west of the abutment, (See photograph 9), there is slight rilling at the crest. Small holes were found beside a bush to the west of this. These holes could be a product of wave action. More bore holes were found about ten feet west of the service spillway box. There was water in these holes about one inch down.

Downstream Slope The downstream slope has been cleared recently of most undesirable growth and debris. The vegetation on the downstream slope was fair. Cattle are grazing on the slope and have caused several eroded paths that run horizontally along the backslope. Erosion was also found under the grass approximately 50 feet from the east abutment. Approximately midway between the outfall for the service spillway and the wet area (See Sketch, page 18), a slight slip was observed approximately five feet above the toe. A small bulge was located on the downstream slope between the east abutment and the outfall pipe. No surface cracks were noted and no evidence of heaving was found on the embankment toe. A utility district has installed a four inch plastic pipe water line along the entire toe of the

dam to service a nearby subdivision. Unconsolidated backfill over this water line has subsided and several holes have developed in the backfill along the pipe.

Abutments No erosion of contact of the embankment with the abutment was noted nor was springs or indications of seepage along the contact of the embankment and the abutments noted.

3.1.2 Seismic Zone Reed Dam No. 1 is in Seismic Zone No. 3. No record of any stability analysis could be found.

3.1.3 Seepage- One auger boring was made at the toe of the downstream slope of the dam, in line with an area of standing water below the dam. The water was located in the boring approximately 30 inches below the surface. This may indicate a possible seepage plane under the dam. Organic material found at the water level in the boring indicated a possible old channel run. No mechanical toe drainage system for this dam was observed. The only evidence of a problem downstream from the embankment observed, was that area of standing water. This area appeared to be in a depression that may have been an old ditch run.

3.1.4 Spillways- The service spillway appeared to be either concrete or concrete block. At the time of observation, it has two logs across it. The riser did not have an antivortex

baffle or any means of protection from debris. The condition of the outfall pipe could not be determined since it was buried under a large pile of debris.

The emergency spillway is a vegetated natural earth swale in the west abutment that does not appear to have been altered in any way. The spillway exits over the west abutment slope into a wooded area and apparently has been in use many times.

3.1.5 Downstream Inspection and Hazard Classification - The Reed Dam No. 1 has a downstream hazard potential classification of high. There is a county road approximately 2500 feet below the dam and on the north side of this road there are three permanent houses and five house trailers in the probable flood path in the event of failure of Reed Dam No 1.

3.1.6 Hydrology and Hydraulics - According to O.C.E. Guidelines, dams with a high hazard, small size classification should have the storage and spillway capacity to pass the ½ PMF without overtopping the dam. The Probable Maximum Precipitation (PMP) of 29.5 inches in six hours yields a ½ PMF of 13.27 inches. Time of concentration of the uncontrolled area of Reed Dam No. 1 was estimated to be 0.25 hours and flood storage from normal pool to the low point of the top of the dam is estimated to be 33 acre-feet. Routing of the ½ PMF (Antecedent Moisture Condition II) produced a

peak outflow of 1940 cfs, which overtopped the dam by 1.75 feet. This storm produced a flow over the dam for four hours. Criteria used to develop the inflow flood hydrograph (½ PMF) for Reed Dam No. 1, assumed failure of Reed Dam No. 3 and the safe passage of the flood by Reed Dam No. 2. (See report on Reed Dam No. 2).

3.2 Conclusions and Recommendations

3.2.1 Conclusions

a. Hydraulic analysis indicates that the Reed Dam No. 1 spillway is seriously inadequate to pass the design flood. Outflow resulting from the ½ PMF will overtop the dam a maximum of 1.75 feet, and produce flow over the dam for four hours.

b. On the basis of engineering judgment and visual observations, the upstream slope appears unstable due to wave action undercutting the slope, resulting in sloughing and small holes.

c. On the basis of engineering judgment and visual observations, the crest and downstream slope of the embankment appears to be stable although some deficiencies were observed on the downstream slope, i.e., a small slip approximately five feet above the toe, a small bulge, and undesirable vegetation.

d. Further investigation should be made to determine the source of water located at approximately the 30 inch depth in an hole augered during the inspection near the toe of the dam.

e. Deficiencies exist with the construction of the service inlet. A guard of some kind should be designed and installed to keep debris from clogging the inlet.

f. The outlet pipe for the service spillway could not be observed because of the debris that has been piled on the top of the outlet pipe and ditch. This debris should be removed and the pipe inspected.

g. Reed Dam No. 1 is within Seismic Zone 3. Stability analysis of the embankment with earthquake loading is not within the scope of this report.

h. Reed Dam No. 1 is considered as "Unsafe-Non-emergency" because it is a dam with obviously serious deficiencies which clearly could develop or are developing into failure modes but do not yet pose the threat of immediate failure.

3.2.2 Recommendations - Remedial work should begin as soon as possible. Consideration should be given to methods and length of time required to completely draw down the reservoir. Qualified engineers should be engaged to:

a. Recommend project modifications that will allow the emergency spillway to safely pass the design flood.

b. Investigate source of water found in auger hole at toe of downstream slope.

c. Recommend methods to stop erosion on the upstream slope and correct other undesirable conditions on slope.

d. Determine condition of riser and recommend modifications for same to protect it from debris.

e. Investigate condition of the outfall pipe and suggest remedial measures if necessary.

f. Evaluate the stability of the dam with earthquake loadings.

g. Develop a regular program of inspection and maintenance of the embankment and spillways on at least an annual basis.

h. Develop an emergency action plan to alert downstream residents in the event a major problem develops with Reed Lake Dam No. 1.

In addition, the owner should:

a. Clear debris from over the outfall pipe and all undesirable vegetation from the dam.

SECTION 4 REVIEW BOARD FINDINGS

The Interagency Review Board for the National Program of Inspection of Non-Federal Dams met in Nashville on 2 June 1981 to examine the technical data contained in the Phase I investigation report for Reed Lake Dam No. 1. The Review Board considered the information and recommended that (1) the spillway should be described as a "seriously inadequate spillway", (2) the conclusions should state that there is evidence of slope instability, (3) the condition classification should be changed from "significantly deficient" to "unsafe-nonemergency", and (4) an emergency action plan should be developed, including a warning system to alert downstream residents, in the event a serious condition develops with the project. They agreed with other report conclusions and recommendations. A copy of the letter report presented by the Review Board is included in Appendix H.

APPENDIX A

DATA SUMMARY SHEET

APPENDIX A
DATA SUMMARY SHEET

A.1 DAM - Reed Dam No. 1

A.1.1 Type - Earth Fill

A.1.2 Dimensions and Elevations - Elevations were determined from assuming a normal pool elevation as shown on the USGS 15 minute quadrangle, Munford, Tennessee.

a.	Crest Length	530 feet
b.	Crest width	14 feet
c.	Height	16.5 feet
d.	Crest elevation	344.5 feet
e.	Service spillway elevation	341.5 feet
f.	Emergency spillway elev. right	343.5 feet
g.	Embankment slope, U/S (from water surface to crest	1V on 2.0H
h.	Embankment slope, D/S (from lower slope to crest)	1V on 3.0H
i.	Size classification	Small

A.1.3 Zones, Cutoffs, Grout Curtains — None

A.1.4 Instrumentation — None

A.2 RESERVOIR AND DRAINAGE AREA

A.2.1 Reservoir - (Normal pool elevation 341.5, 3.0 feet below the effective crest).

a.	Surface area	10.1 acres
b.	Length of pool	900 feet
c.	Capacity (Normal pool)	37 acre-feet
d.	Maximum surface area	11.07 acres
e.	Flood storage	33 acre-feet

A.2.2 Drainage Area

a. Size - 121.21 acres (0.19 square miles)
b. Characteristics:
Average water shed slope, 7.5%; soil, Memphis Silt Loam; cover, woodland 34%, open land 22%, water 44%.

c.	Runoff PMF (AMC II)	26.54 inches
d.	Runoff ½ PMF (AMC II)	13.27 inches
e.	Runoff P_{100} (AMC III)	4.47 inches

A.3 OUTLET STRUCTURES

A.3.1 Drawdown Facilities - None

A.3.2 Service Spillway - Concrete riser with inside dimensions of 2.1 ft. x 2.7 ft. Riser does not have antivortex baffle. Riser is 6.83 feet high with 15 inch concrete pipe outfall.

a.	Crest elevation	341.4 feet MSL
b.	Length 15" pipe	70 feet
c.	Maximum discharge capacity	21.5 cfs

A.3.3 Emergency Spillway (west abutment)

a.	Crest elevation	343.5 feet
b.	Side slope (left)	1V on 2.1H
c.	Side slope (right)	1V on 3.1H
d.	Depth	1.0 feet
e.	Bottom width	33 feet
f.	Maximum capacity	140 cfs
g.	Control section	NA

A.4 HISTORICAL DATA

A.4.1	Construction Date	1952
A.4.2	Designer	Unknown
A.4.3	Builder	Unknown
A.4.4	Owner	Paul Wayne Reed
A.4.5	Previous Inspection	Inventory Only
A.4.6	Seismic Zone	3

A.5 DOWNSTREAM HAZARD DATA

A.5.1 Downstream Hazard Potential Classification

a.	Corps of Engineers	High
b.	State of Tennessee	I
A.5.2	Persons in Probable Flood Path	27 persons (est.)
A.5.3	Downstream Property	3 permanent houses & 5 trailers
A.5.4	Warning Systems	None

APPENDIX B

SKETCHES AND LOCATION MAPS

A.3.2 Service Spillway - Concrete riser with inside dimensions of 2.1 ft. x 2.7 ft. Riser does not have antivortex baffle. Riser is 6.83 feet high with 15 inch concrete pipe outfall.

a.	Crest elevation	341.4 feet MSL
b.	Length 15" pipe	70 feet
c.	Maximum discharge capacity	21.5 cfs

A.3.3 Emergency Spillway (west abutment)

a.	Crest elevation	343.5 feet
b.	Side slope (left)	1V on 2H
c.	Side slope (right)	1V on 3H
d.	Depth	1.0 feet
e.	Bottom width	33 feet
f.	Maximum capacity	140 cfs
g.	Control section	NA

A.4 HISTORICAL DATA

A.4.1	Construction Date	1952
A.4.2	Designer	Unknown
A.4.3	Builder	Unknown
A.4.4	Owner	Paul Wayne Reed
A.4.5	Previous Inspection	Inventory Only
A.4.6	Seismic Zone	3

A.5 DOWNSTREAM HAZARD DATA

A.5.1 Downstream Hazard Potential Classification

a.	Corps of Engineers	High
b.	State of Tennessee	I
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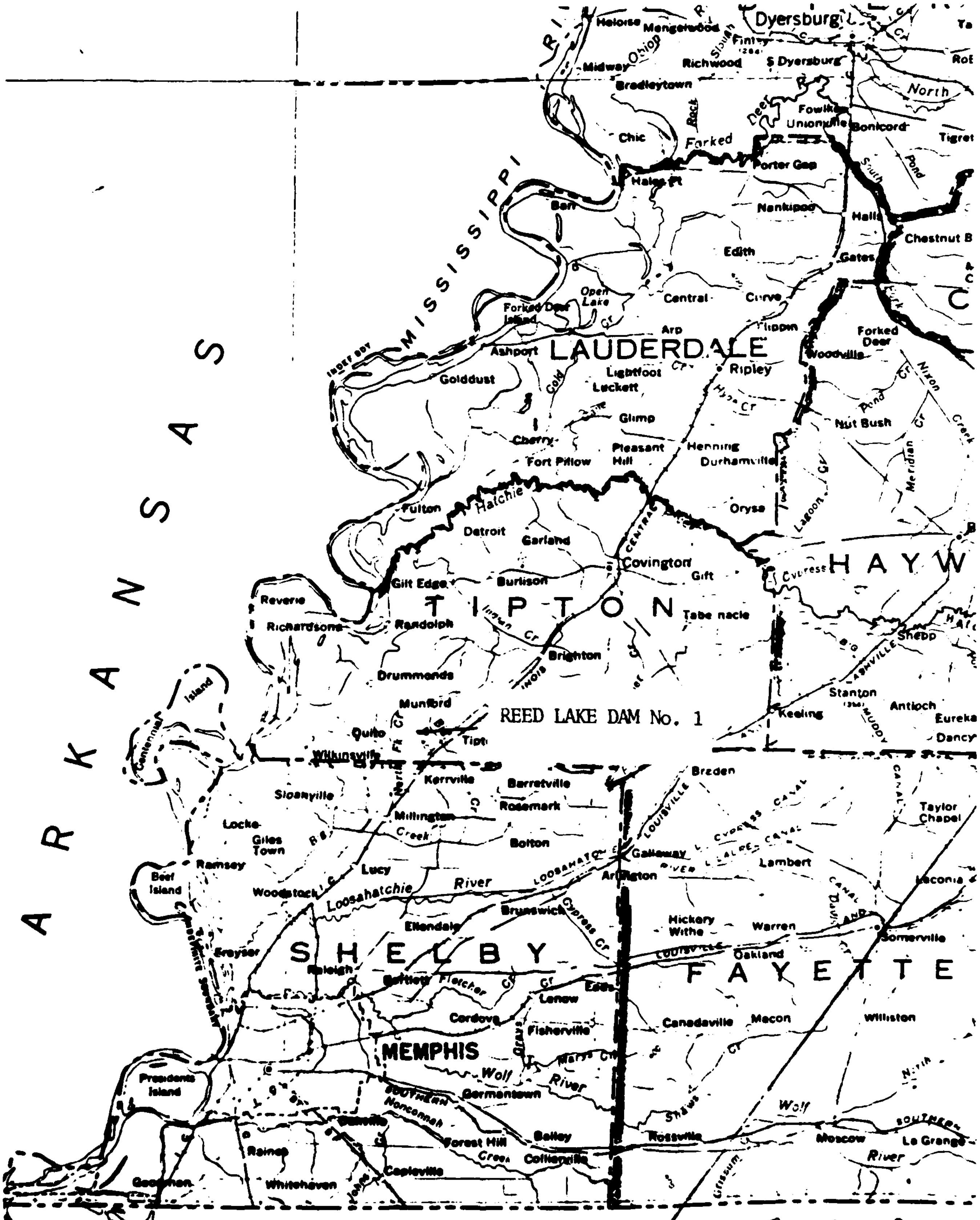
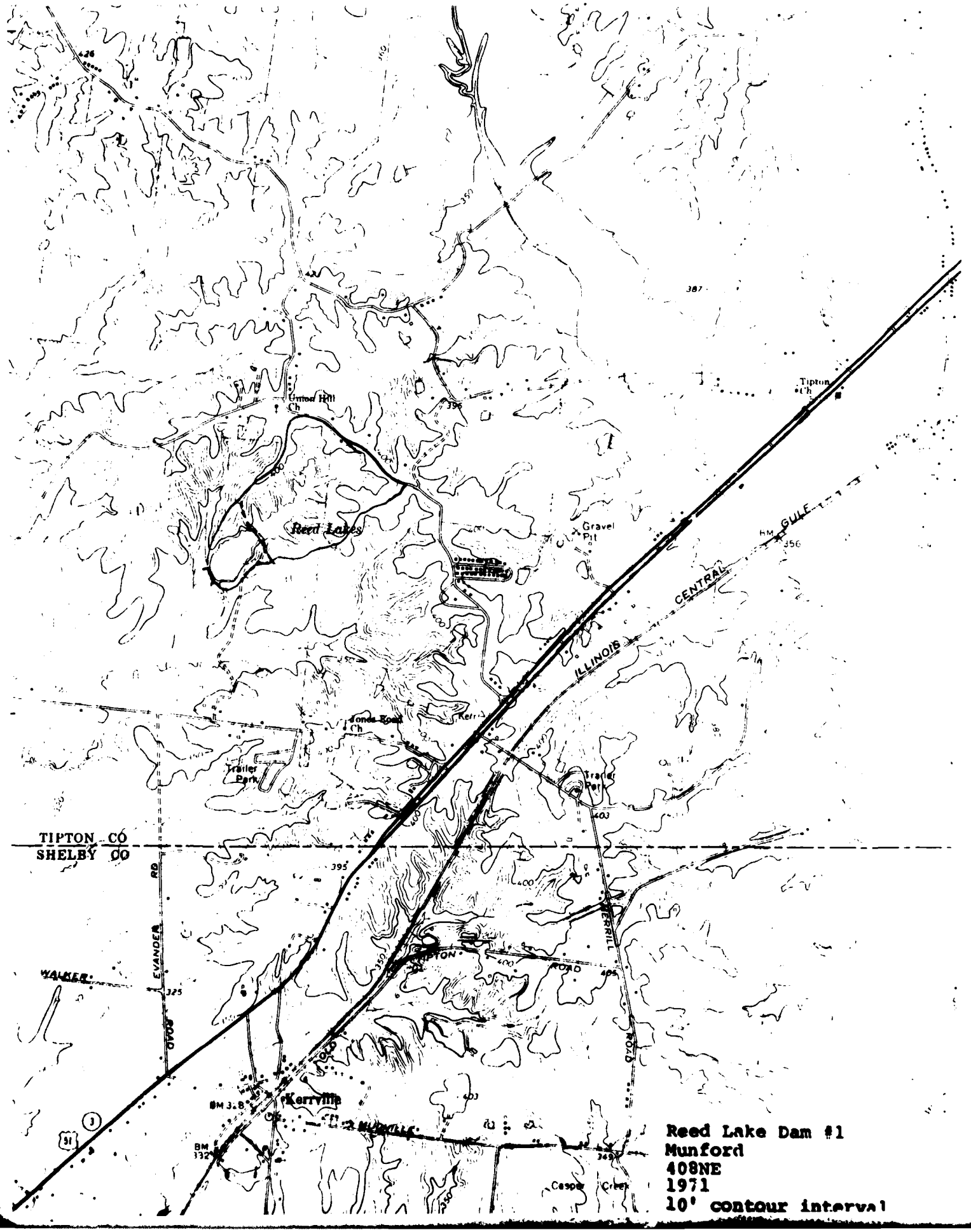
A.5.4	Warning Systems	None

APPENDIX B

SKETCHES AND LOCATION MAPS



LOCATION MAP
REED LAKE DAM
No. 1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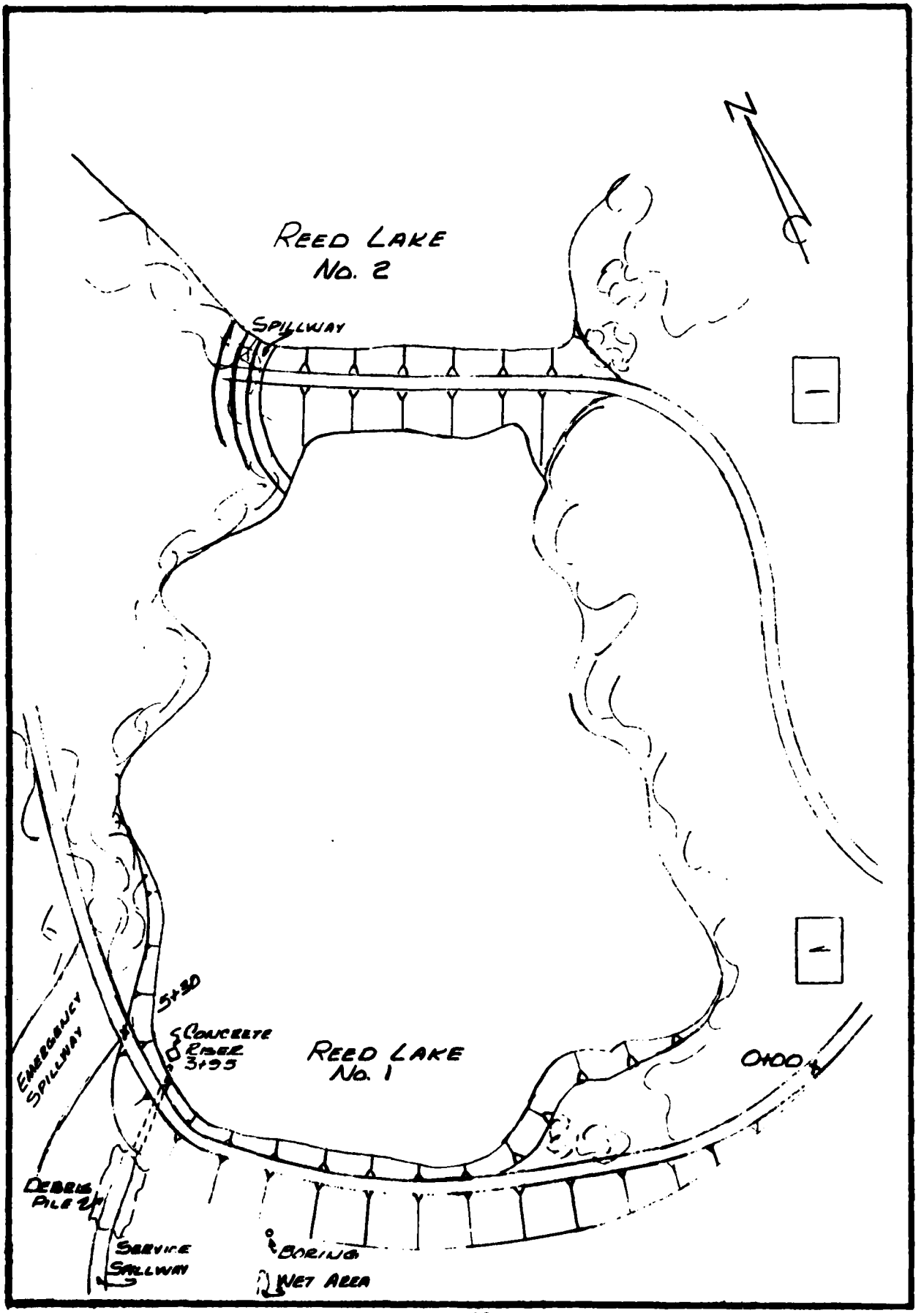
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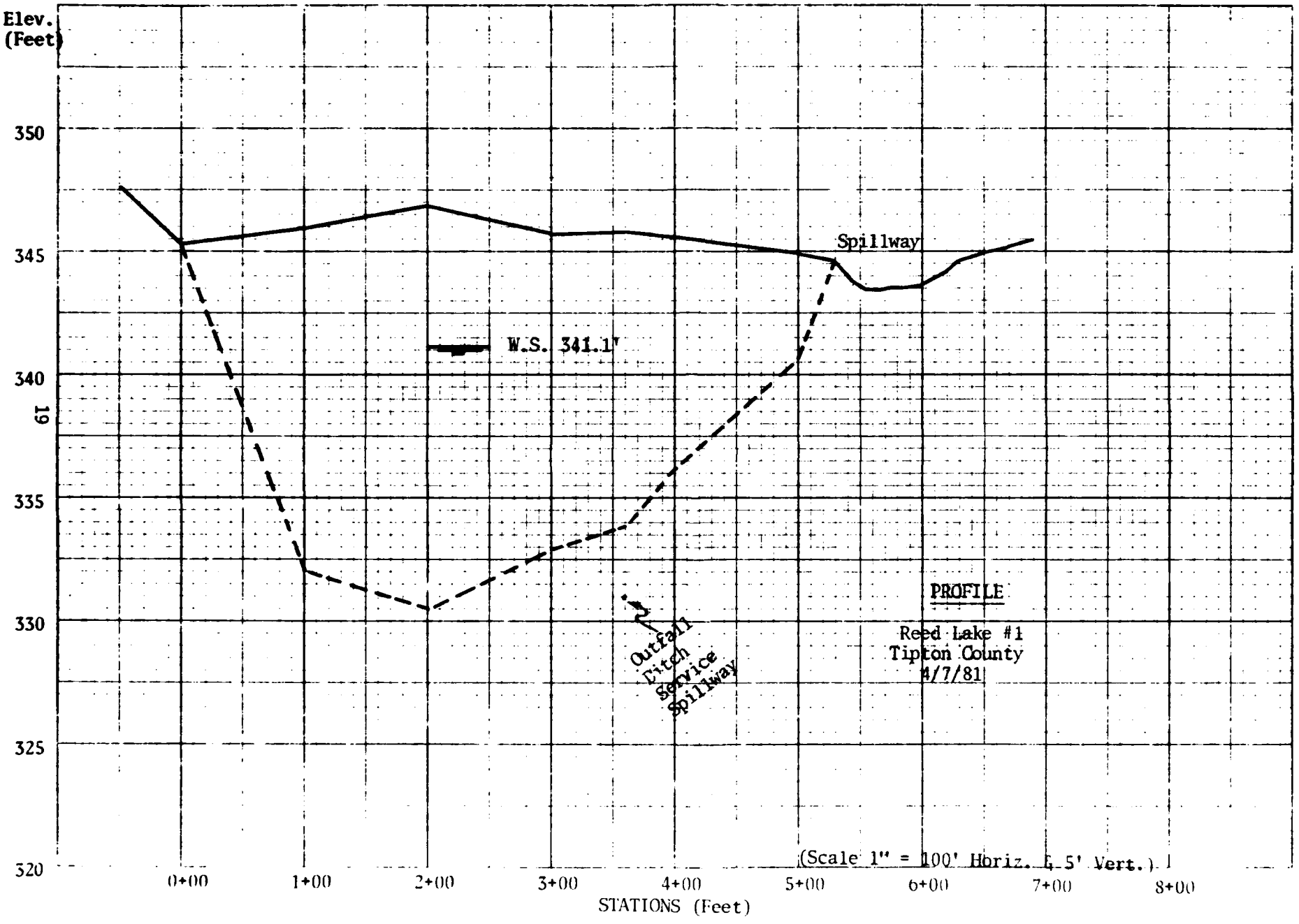
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Outfall Ditch
Service Spillway
PROFILE
Reed Lake #1
Tipton County
4/7/81
(Scale 1" = 100' Horiz. & 5' Vert.)
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2+00
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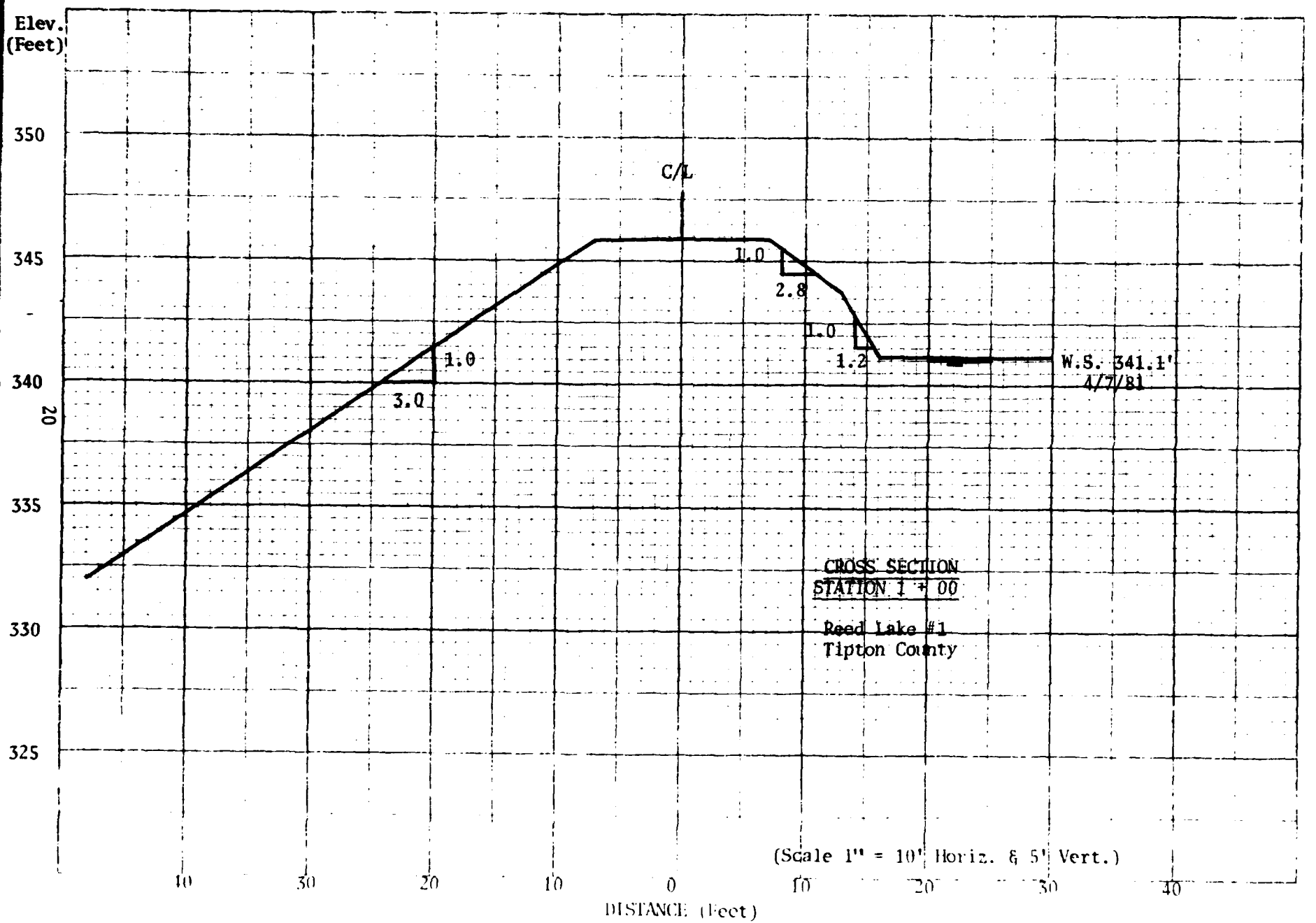
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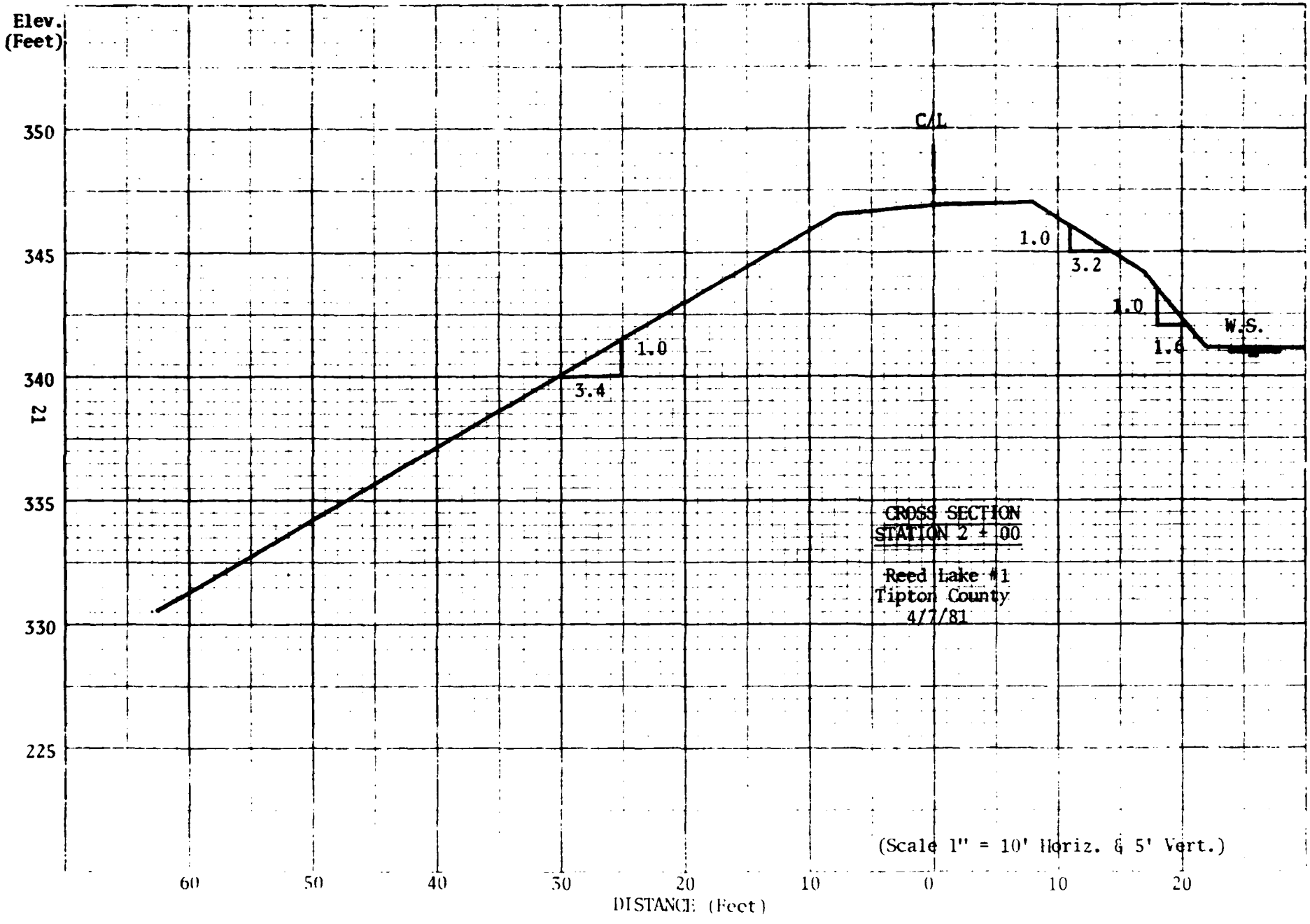
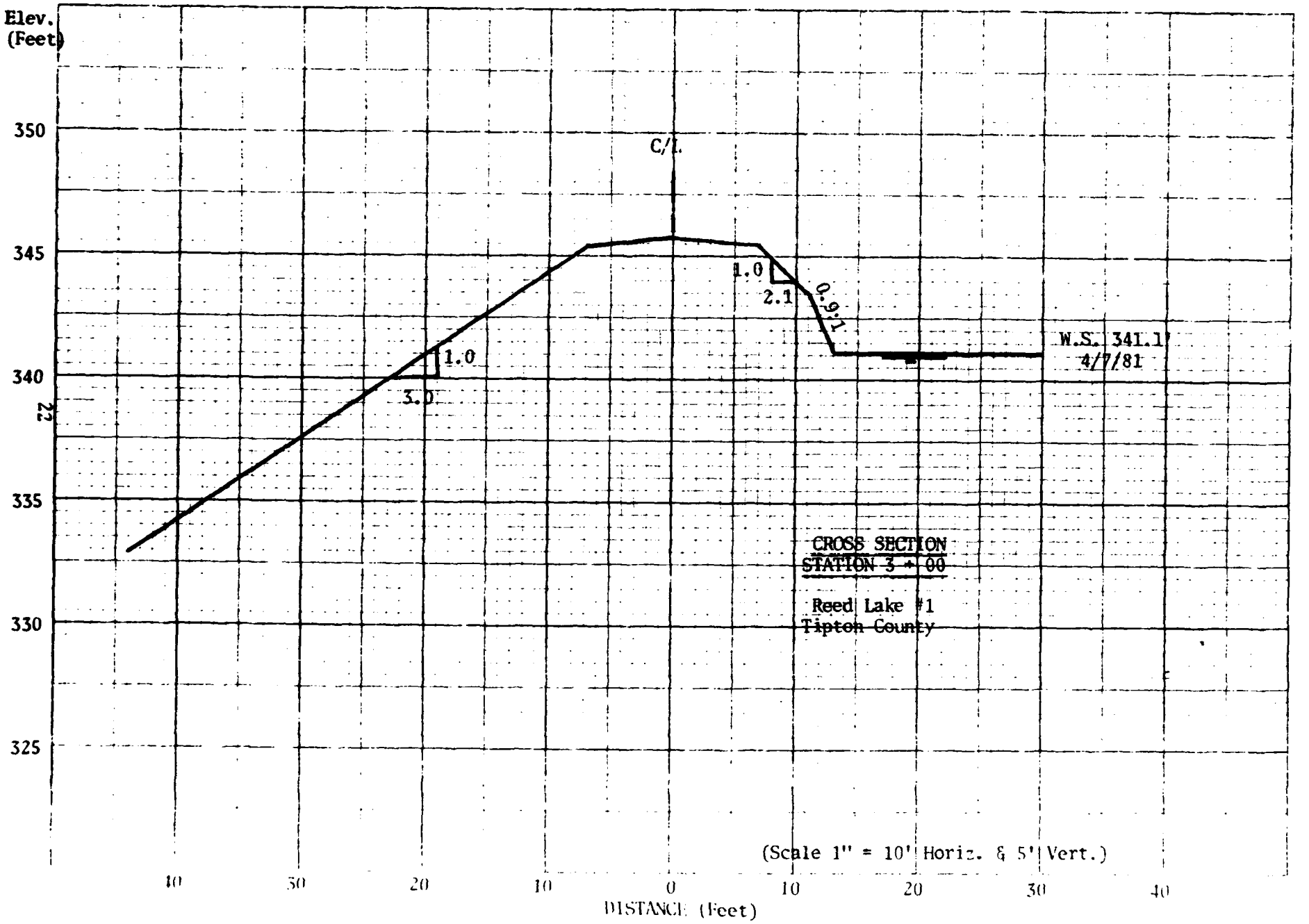
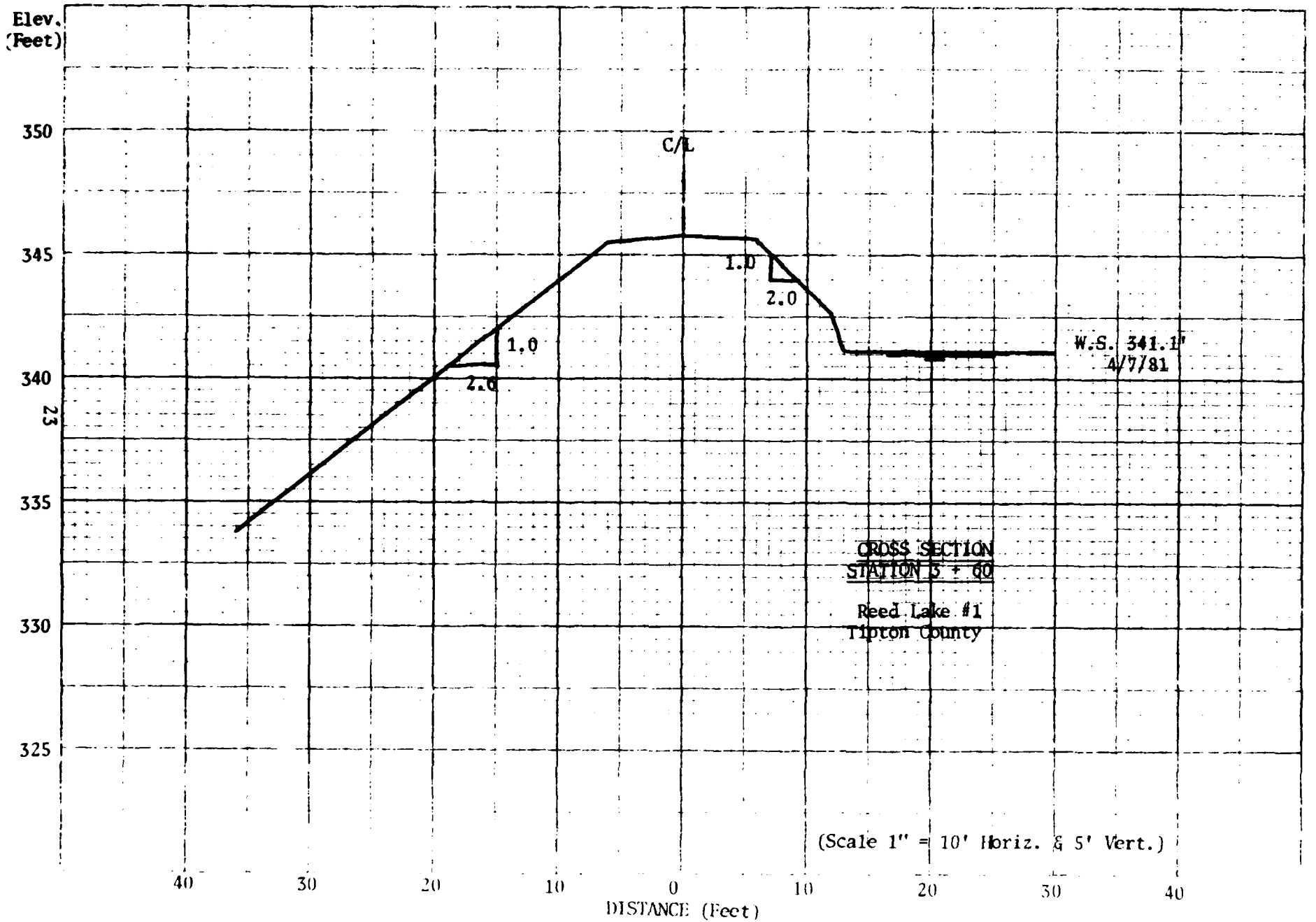
1.2
1.0
3.0
W.S. 341.1'
4/7/81
CROSS SECTION
STATION 1 + 00
Reed Lake #1
Tipton County
(Scale 1" = 10' Horiz. & 5' Vert.)
10
30
20
10
0
10
20
30
40
DISTANCE (Feet)


Elev. (Feet)
350
345
340
335
330
225
C/L
1.0
3.2
1.0
1.0
3.4
W.S.
CROSS SECTION
STATION 2 + 00
Reed Lake #1
Tipton County
4/7/81
(Scale 1" = 10' Horiz. & 5' Vert.)
60
50
40
30
20
10
0
10
20
DISTANCE (Feet)


Elev. (Feet)
350
345
340
335
330
325
C/L.
1.0
2.1
0.9:1
1.0
3.0
W.S. 341.1'
4/7/81
CROSS SECTION
STATION 3 + 00
Reed Lake #1
Tipton County
(Scale 1" = 10' Horiz. & 5' Vert.)
40
30
20
10
0
10
20
30
40
DISTANCE (Feet)


Elev.
(Feet)
350
345
340
335
330
325
C/L
1.0
2.0
1.0
2.0
W.S. 341.1'
4/7/81
CROSS SECTION
STATION 5 + 60
Reed Lake #1
Tipton County
(Scale 1" = 10' Horiz. & 5' Vert.)
40
30
20
10
0
10
20
30
40
DISTANCE (Feet)

APPENDIX C

PHOTOGRAPHIC RECORD

1. Top of Reed Dam No. 1.

2. Upstream slope Reed Dam No. 1. Note wave erosion.

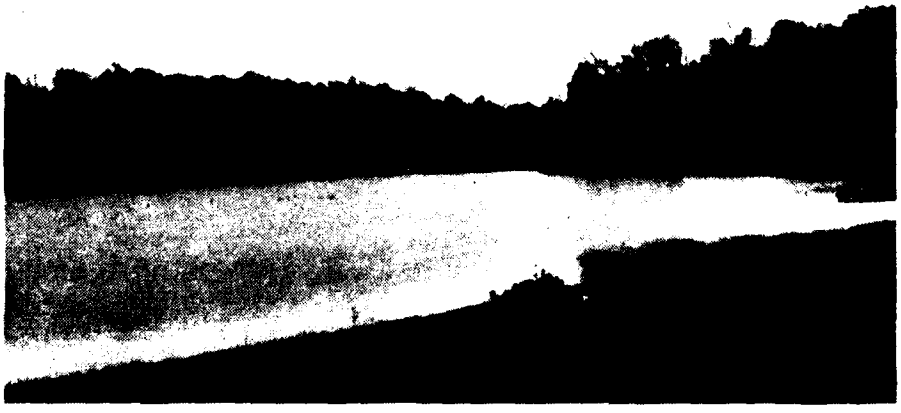
3. Downstream slope Reed Dam No. 1. Outfall ditch for service spillway in foreground.

4. Service spillway Reed Dam No. 1. Note absence of antivortex battle or debris guard.

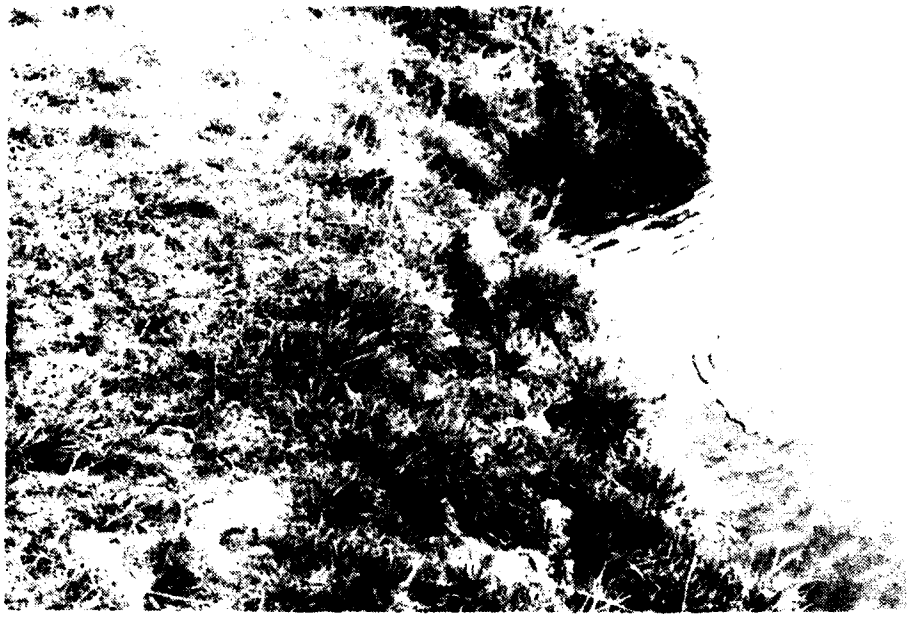
5. Outfall for service spillway Reed Dam No. 1. Outfall pipe covered several feet with debris. Flowing water is evidence that pipe is open.

6. Wet area beginning at toe of downstream slope of Reed Dam No. 1.

7. Emergency spillway in right abutment of Reed Dam No. 1. Primarily low point in abutment without design.



8. Reed Lake No. 1. Note Reed Dam No. 2 at upper end of lake.



9. Sloughing of the upstream slope, Reed Dam No. 1.

APPENDIX D

INSPECTION TEAM TRIP REPORTS

TRIP REPORT
REED DAM No. 1
TIPTON COUNTY, TENNESSEE

GENERAL ENGINEERING OBSERVATIONS
April 7, 1981

GENERAL. An engineering inspection of the Reed Dam No. 1 was made with Dr. Fred H. Kellogg of Kellogg Engineering, George Moore, and David Roe of the Tennessee Division of Water Resources on April 7, 1981. The weather was partly cloudy with an average temperature of 65 degrees. This dam was reported by the owner to have been built in 1952 with some assistance from the USDA Soil Conservation Service in Tipton County in design of the dam. No other construction history is available on this dam.

EMBANKMENT. (See Exhibit B). Reed Lake Dam No. 1 is a crescent shaped, compacted earth fill dam with an estimated crest width of 12 feet. It has an east-west longitudinal alignment. The crest is used as an access road for this lake and two upper lakes in the system and is generally in good shape. No longitudinal surface cracks or transverse surface cracks were observed on the crest.

The upstream slope has been eroded by many paths down to the water's edge by both cattle and fisherman using the lake. There are a few bushes on the slope and sloughing was encountered generally along the slope. This sloughing generally occurred 1 to 2 feet above the water line. There is

no slope protection for wave action. Small holes (jugs) were observed on the slope.

The downstream slope had been cleared recently of most undesirable growth and debris. The vegetation on the downstream slope was fair. Cattle are grazing on the slope and have caused several eroded paths that run horizontally along the backslope. Erosion was also found under the grass approximately 50 feet from the east abutment. A small bulge was located on the downstream slope between the east abutment and the outlet pipe. No surface cracks were noted, and no evidence of heaving was found on the embankment toe. One auger boring was made at the toe of the dam, in line with an area of standing water below the dam. Water was located in the boring approximately 30 inches below the surface. This may indicate a possible seepage plane under the dam. Organic material found at the water level in the boring indicated a possible old channel run. There is no toe drainage system for this dam. Fill contact with the outlet structure could not be observed due to brush and trash that had been piled in the ditch covering the pipe to a depth of several feet. No erosion of contact of the embankment with the abutment was noted nor were springs or other indications of seepage along the contact of the embankment and abutments noted. The only evidence of a problem downstream from the embankment observed, was the area of standing water. This area appeared to be in a depression that may have been an old ditch run.

A utility district has installed a 4 inch plastic pipe water line along the entire toe of the dam to service a nearby subdivision. Backfill over

this water line has subsided and has several holes along the pipe.

SPILLWAYS. The service spillway is a concrete block box with inside dimensions of 2.1 feet in width and 2.7 feet in length. The maximum depth of the inside of the box is 6.8 feet with the invert of the outlet pipe 0.5 feet above the bottom of the riser. The outlet pipe is a 15 inch concrete pipe. The box is approximately ten feet from the embankment at the water line.

The emergency spillway is a vegetated, natural earth swale in the west abutment. No control section could be determined by observation. The spillway exits over the west abutment slope into a wooded area and apparently has been in use several times.

The reservoir slopes around the lake are in fair condition. Sedimentation of the lake is not known, but the lake was clear at the time of inspection. The area downstream from the dam appeared to be in good condition There were several houses and trailers observed that probably are in the flood path in case of failure of the dam. There is also a county road approximately 1500 feet below the dam.

CONCLUSIONS. The sloughing along the upstream face of the dam and the presence of small jugs that may be a product of wave action points up to the need for riprap, or some form of protection, for the upstream slope. The presence of water found in the boring at the toe of the dam indicates a possible seepage plane and needs to be investigated. The debris piled in the ditch over the outlet pipe needs to be removed so that the outlet pipe can be inspected for any damage that might be present.

RECOMMENDATIONS. The dam appears to be in good condition but the debris pile needs to be removed from the area over the outlet pipe and exit ditch. An engineering study needs to be made on the possibility of a seepage plane under the dam. The condition of the service spillway pipe needs to be determined after the debris has been removed.

Wm. E. Bush

William E. Bush, P.E., Director
Civil and Water Resources Engineering
TN License No. 4177

REED LAKE NO. 1 DAM INSPECTION

INTRODUCTION. A series of three earth dams impounds reservoirs which are fed from a 100-acre drainage area in Tipton County, Tennessee. They are designated here as Reed Lake Dam No. 1, which is farthest downstream, Peed Lake Dam No. 2 in the middle and Reed Lake No. 3, the farthest upstream. No. 3 was built in 1946, No. 2 in 1949, and No. 1 in 1952. The dams are located in an area of loess hills, near Kerrville. The dam is oriented east and west with the pool to the north. The soils and fill are clayey silts (class ML in the Unified Classification System) to silty clays (CL in the Unified System). The underlying terrace gravels do not appear to affect the dam.

East Abutment. The east abutment is in slightly rolling hills consisting of loess soil with a good grass cover. No serious erosion has occurred at the abutment-fill contact. The slope of the abutment is fairly flat, possibly 12 to 15%.

Crest. The crest is 12 ft wide, with a roadway covered by some gravel, and thin strips of roofing materials. It has been roughened at the edges by cattle tracks.

Upstream Slope. Water is about 4 ft below the crest. Just below water level, the slope has been terraced by wave wash. The slope is nearly vertical for a distance of 1 or 2 ft above water level. Above this there has been a slight sloughing near the east abutment. The slope is covered with bushes for the first 75 ft west of the abutment. Farther west, there is constant sloughing 1 - 2 ft above water level. Erosion on this slope has been aggravated by cattle tracks which have punched 1 - 2" deep when the soil was wet and soft. Above the sloughed

and wave-cut section, the slopes are about 1 V on 3 H. There are numerous crayfish holes at the waters edge. A severly sloughed area about 150' west of the abutment has crayfish or boring animal holes just above it. About 250' west of the abutment, there is slight rilling at the crest. Jugs were found beside a bush to the west of this. More bore holes were found about 10' west of the service spillway box. There was water in these holes about 1' down.

Service Spillways. The service spillway intake is a 2.1 x 2.7' concrete block box feeding a 15" concrete pipe passing under the dam. There is some driftwood over the box. Its outlet was buried under debris (mostly tree branches) and could not be seen. A ditch has been washed out here, and there was some water in the ditch. Some holes, about 1-1/2" in diameter were noted between the end of the ditch and the toe of the dam. These were about 18" deep.

Emergency Spillway. The emergency spillway is located at the west abutment. It starts with a slope about 25' long down to the base until it is 2 - 3' below the crest. The deep section extends for another 36", after which it slopes upward for about 45'. The outfall angles downstream at about 30° to the axis of the dam, discharging into the stream below the dam.

West Abutment. No erosion at the contact between the fill and the abutment was noted. The abutment is a gentle rise, well covered with grass. A 4" plastic pipe water line extends from the abutment, across the outfall of the spillway and along the toe of the dam.

Downstream Slope. Near the west abutment, there are 6" to 8" cut-off stumps on the slope. This slope is about 1V on 2-1/2 to 3H. It is covered by a considerable amount of brush. About 200' east of the

abutment and about 50' south of the toe of the dam, there is swampy ground and stagnant water along a small tributary to the main stream. This extends more than 100' toward the main stream, which is here some 600 - 700' south of the dam. Passing eastward along the downstream slope, there is some rilling and erosion caused by cattle tracks. A slight slip was found about 5' above the toe, just to the west of the swampy area. East of this, a slight bulge in the downstream slope extends about 150 ft to the east. About 50' from the east abutment, there has been considerable erosion under the grass. An auger hole bored near the swampy area, at the downstream toe, showed blue cohesive silt that is typical of the alluvium in small watercourses, with water at depth 30".

Recommendations. The debris covering the outlet of the service spillway should be removed, so that the control valve can be checked, and any evidence of leakage around the conduit pipe noted. While there is a good grass cover, the grass apparently does not afford much protection against erosion. Eventually, a more effective vegetative protection will be needed. Within the next few years, the pool should be lowered sufficiently to permit repair of the terracing in the upstream slope. A permanent repair could be obtained by laying filter cloth along the eroded surface, covering it with about 6" of clean sand, and covering this with fragments of rock or concrete. This should be weighed against a temporary repair in which the slopes are brought back to grade with well-compacted on-site fill material, covered with Bremuda grass or other protective vegetation. The temporary repair would need to be repeated about every 10 years.

Report Submitted 4/18/81

F. H. Kellogg, P. E.

APPENDIX E

HYDRAULIC AND HYDROLOGIC DATA

HYDRAULICS AND HYDROLOGIC CALCULATIONS

Reed Lake Dam No. 1 is located in Tipton County, Tennessee. The present land use is estimated to be 34 percent woodland, 22 percent open land, and 44 percent water. The soil is predominantly Memphis Silt Loam and is classified as a "B" soil. The runoff curve number was calculated to be 79 AMC II.

Reed Lake Dam No. 1 is a small size, high hazard potential dam. As such, it is required to pass a ½ PMF with overtopping. Using the U.S. Weather Service TP-40, the 6-hour PMP was estimated to be 29.5 inches yielding 26/54 inches runoff (RCN 79 AMC II). The ½ PMF which is derived from the Probable Maximum Precipitation was routed with a 13.27 inch runoff (RCN 79 AMC II).

The total inflow into the reservoir is about 149 acre-feet with a maximum peak of 2199. Reed Lake Dam No. 1 reservoir has a maximum storage from the crest of the service spillway to the top of the dam of 33 acre-feet and a maximum spillway discharge rate of 162 cfs. The impoundment is insufficient to safely pass the ½ PMF.

The 6-hour, 100-year flood containing 5.5 inches precipitation was routed through the dam using a RCN of 91 (AMC III). This produced a runoff of 4.47 inches and a routed peak discharge of 43 cfs. Reed Lake Dam No. 1 contained the storm with flows of 0.4 feet in the emergency spillway and a 0.6 foot freeboard.

The 1-10 day, 100-year storm was routed through the structure and did produce

flow in the emergency spillway.

The inflow hydrograph was calculated by methods contained in Section 4, Chapter 21, of the SCS National Engineering Handbook. Weir constants in the formula $Q=CLH^{3/2}$ were found in King and Brater "Handbook of Hydraulics", fifth edition. Estimates of discharge for the natural swale used as the emergency spillway were taken from Agriculture Handbook No. 387, USDA Soil Conservation Service, "Ponds for Water Supply and Recreation", dated January 1971. The routing equation used was:

$$I_1 + I_2 + \left(\frac{2S_1}{\Delta t} - O_1\right) = \left(\frac{2S_2}{\Delta t} + O_2\right) .$$

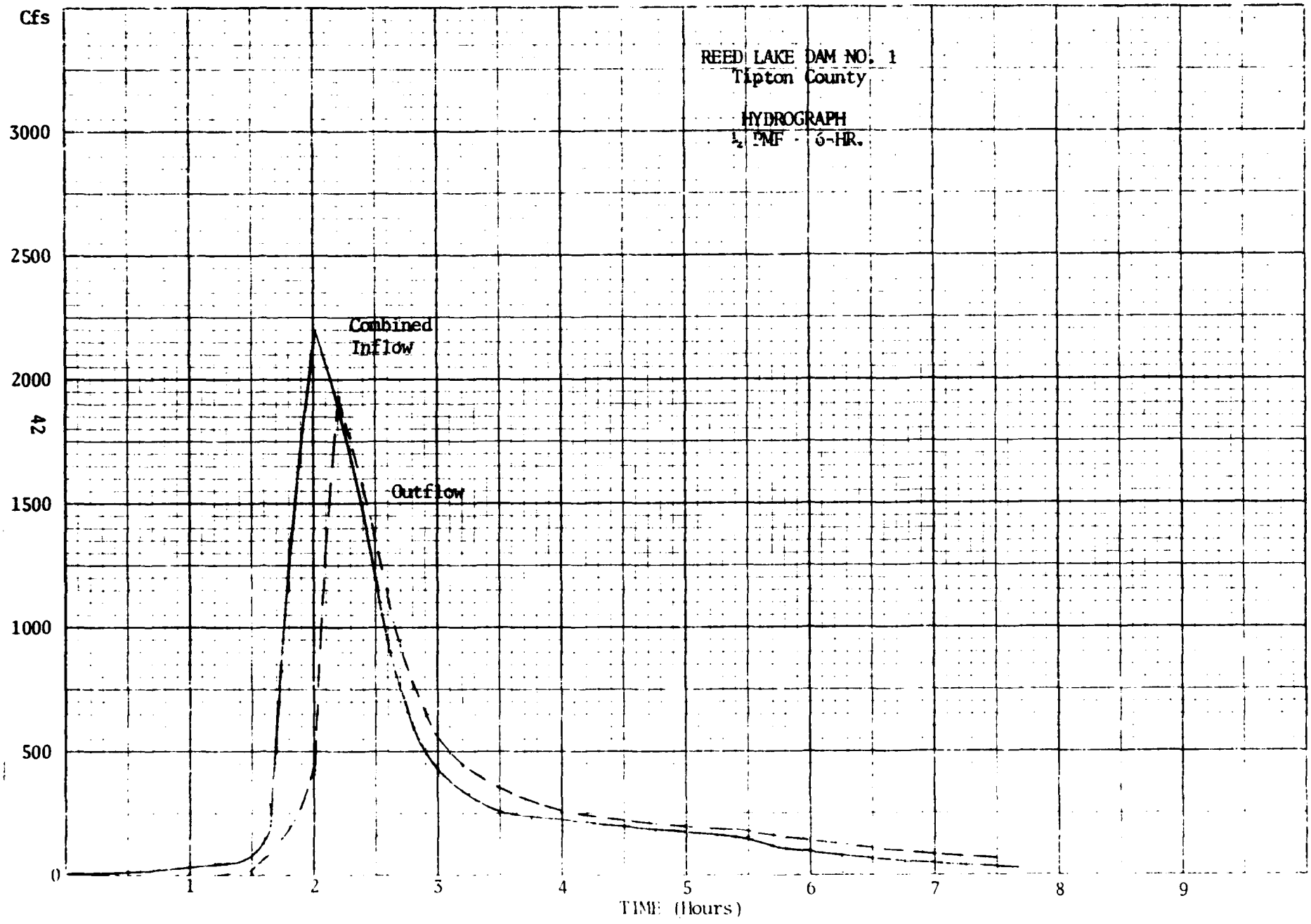
Basic Engineering Data was obtained from the following sources: Engineering surveys of the impoundment structure; U.S. Geologic Survey Topographic Maps; Aerial photographs; USDA Soil Conservation Service Soil Survey Maps; Rainfall Data and Hazard Classification from the Tennessee Division of Water Resources.

HYDRAULIC AND HYDROLOGIC SUMMARY

Frequency of Occurrence	Duration	Antecedent Moisture Condition II	III
100-year	6-hour	Will Pass	Will Pass
100-year	10-day	2/	2/
½ PMF[1]	6-hour	Will Overtop 1.75 feet for 4.0 hours	Will Overtop 1.8 feet for 4.1 hours
PMF	6-hour	Will Overtop 1.8 feet for 4.1 hours	Will Overtop 2.1 feet 4.2 hours

[1]Probable Maximum Flood

[2]Produce Spillway Flow


Cfs
REED LAKE DAM NO. 1
Tipton County
HYDROGRAPH
½ PMF - 6-HR.
3000
2500
2000
1500
1000
500
0
Combined Inflow
Outflow
42
1
2
3
4
5
6
7
8
9
TIME (Hours)

NAME OF DAM =REED LAKE #1

STORM=1/2 PMF-6 HOURS-AMC II
TIME INCREMENT IN HOURS = 0.1

TIME	I (CFS)	2S/DT-O	2S/DT+O	O (CFS)
0.00	0.00	0.00	3.00	0.00
0.10	1.00	0.28	1.00	0.36
0.20	2.00	2.02	3.28	0.63
0.30	3.00	5.20	7.02	0.91
0.40	10.00	15.35	13.30	1.42
0.50	12.00	33.35	37.35	2.00
0.60	20.00	60.13	53.35	2.61
0.70	25.00	98.59	105.13	3.27
0.80	28.00	143.81	151.59	3.89
0.90	30.00	192.89	201.81	4.46
1.00	31.00	243.96	253.89	4.97
1.10	35.00	299.04	333.96	5.46
1.20	45.00	367.02	373.04	6.01
1.30	50.00	448.83	452.02	6.60
1.40	55.00	539.41	533.85	7.28
1.50	67.00	645.80	631.44	7.82

1.60	150.00	845.06	852.80	8.87
1.70	650.00	1620.96	1645.06	12.05
1.80	1300.00	3536.17	3573.96	17.40
1.90	1750.00	6463.09	6536.17	61.54
2.00	2199.00	9562.31	10412.09	424.89
2.10	2050.00	11012.72	13811.31	1399.39
2.20	1860.00	11043.50	14922.72	1939.61
2.30	1690.00	11062.72	14593.50	1765.39
2.40	1430.00	11053.95	14203.72	1574.88
2.50	1192.00	10994.66	13695.95	1350.69
2.60	920.00	10862.82	13136.66	1171.92
2.70	750.00	10675.16	12532.82	993.93
2.80	600.00	10464.87	12025.16	780.15
2.90	500.00	10241.45	11554.87	661.71
3.00	410.00	10016.44	11151.45	567.51
3.10	380.00	9812.36	10836.44	497.04
3.20	340.00	9640.39	10532.36	445.99

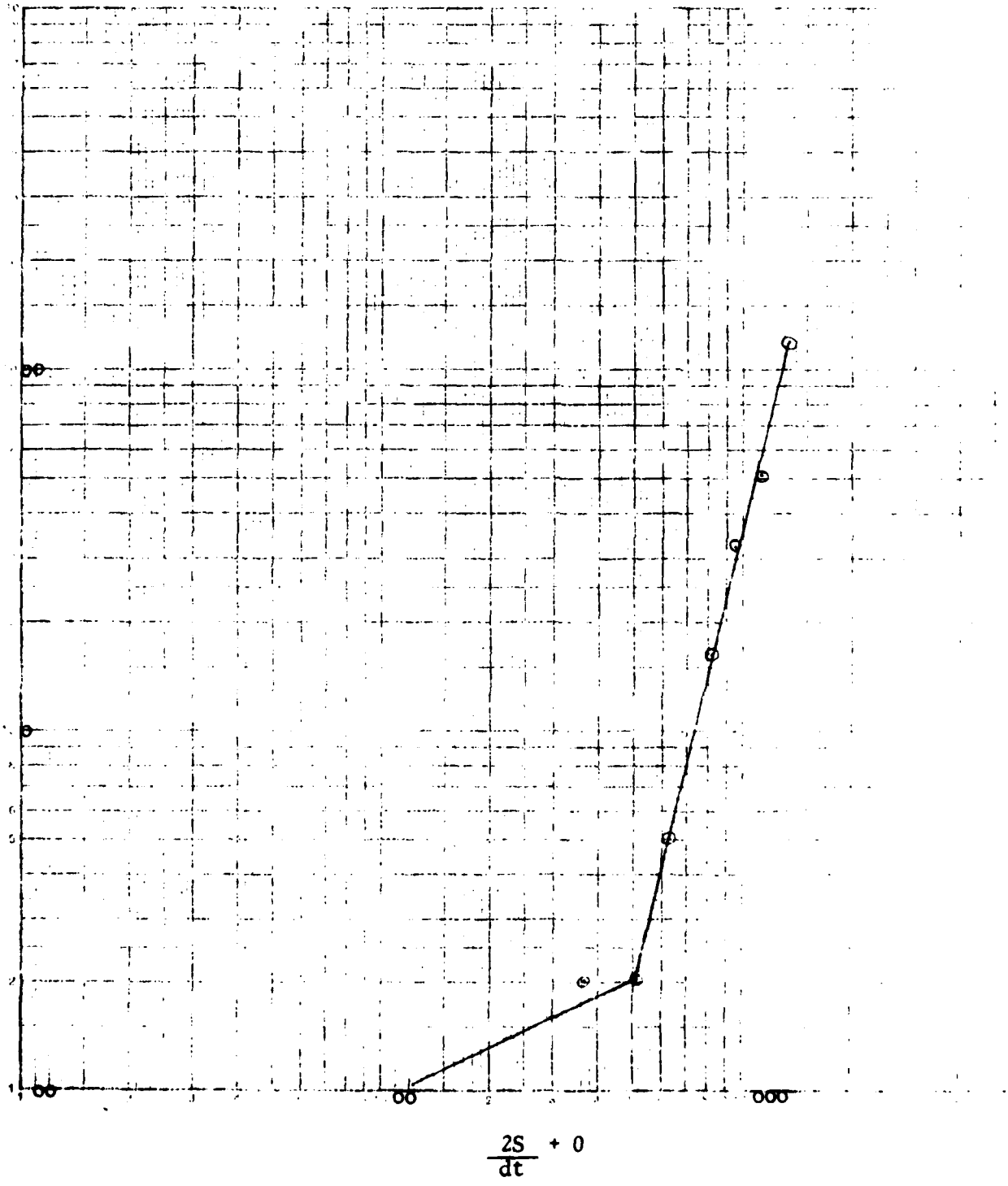
3.30	300.00	9475.03	10233.39	432.68
3.40	275.00	9318.11	10053.03	405.90
3.50	250.00	9172.69	9843.11	385.21
3.60	243.00	9048.43	9673.69	311.13
3.70	240.00	8949.81	9536.43	293.31
3.80	230.00	8862.87	9419.81	278.47
3.90	229.00	8788.95	9321.87	266.46
4.00	226.00	8729.57	9243.95	257.19
4.10	220.00	8677.05	9175.57	249.26
4.20	215.00	8627.93	9113.05	242.06
4.30	201.00	8574.90	9043.93	234.70
4.40	200.00	8521.57	8973.90	227.16
4.50	195.00	8474.78	8913.57	220.30
4.60	190.00	8429.74	8853.78	214.02
4.70	185.00	8385.85	8794.74	208.44
4.80	180.00	8342.68	8733.95	204.04
4.90	175.00	8299.87	8697.68	198.91
5.00	172.00	8258.77	8645.87	194.05

5.10	165.00	8217.25	8535.77	139.26
5.20	160.00	8173.58	8543.25	184.34
5.30	155.00	8129.58	8483.58	179.50
5.40	150.00	8085.12	8434.58	174.73
5.50	140.00	8035.93	8375.12	169.59
5.60	130.00	7978.41	8305.93	163.76
5.70	115.00	7909.40	8223.41	157.01
5.80	105.00	7830.25	8123.40	149.57
5.90	100.00	7750.45	8033.25	142.40
6.00	99.00	7677.27	7943.45	136.09
6.10	85.00	7601.59	7851.27	129.84
6.20	80.00	7519.86	7756.59	123.37
6.30	75.00	7440.13	7674.86	117.34
6.40	70.00	7361.87	7595.19	111.66
6.50	65.00	7284.31	7495.87	106.28
6.60	60.00	7207.03	7409.31	101.14

6.70	55.00	7129.62	7323.03	96.21
6.80	52.00	7053.50	7235.62	91.50
6.90	50.00	6980.89	7155.50	87.31
7.00	49.00	6912.91	7079.89	83.48
7.10	45.00	6847.10	7008.92	79.91
7.20	40.00	6779.35	6938.10	76.37
7.30	35.00	6708.71	6864.35	72.82
7.40	33.00	6637.89	6793.71	69.41
7.50	30.00	6568.52	6723.89	66.19
7.60	29.00	6501.15	6657.52	63.18
7.70	20.00	6429.88	6583.15	60.13

REED LAKE DAM NO. 1

½ PMF - 6-HR.



Note: dt = 0.1 hrs. (Routing time shortened to provide more accuracy in routing equation)

****
POWER CURVE FIT EQUATION
****

PROJECT = REED LAKE #1

Y=A*X^B

A = 0.359955439

B = 4.74051E-01

COEF. OF DETERMINATION= 1.000

****

****
POWER CURVE FIT EQUATION
****

PROJECT = REED LAKE #1

Y=A*X^B

A = 4.77306E-15

B = 4.21076E+00

COEF. OF DETERMINATION= 0.947

****

FOR X= 5101.00000 THEN PROJECTED Y= 23.43957

FOR X= 6351.00000 THEN PROJECTED Y= 52.78836

FOR X= 8142.00000 THEN PROJECTED Y= 130.53533

FOR X= 9522.00000 THEN PROJECTED Y= 231.44702

FOR X= 11148.00000 THEN PROJECTED Y= 386.77820

FOR X= 13290.00000 THEN PROJECTED Y= 1189.66012

HYDROGRAPH COMPUTATION

DATE May 8, 1981
COMPUTED BY JFS
CHECKED BY

Project Reed Lake Dam No. 1

DR. AREA 0.04 SQ. MI. STRUCTURE CLASS

T_c 0.25 HR. STORM DURATION 6 HR.

POINT RAINFALL 16.07 IN.

ADJUSTED RAINFALL:

AREAL FACTOR IN.

DURATION FACTOR IN.

RUNOFF CURVE NO. 79

Q 13.27 IN.

HYDROGRAPH FAMILY NO. 1

COMPUTED T_p .175 HR.

T_o 5.51 HR.

(T_o / T_p)

COMPUTED 31.49 ; USED 36

REVISED T_p .153

$q_p = \frac{484A}{REV.\ T_p} = 126.5$ CFS.

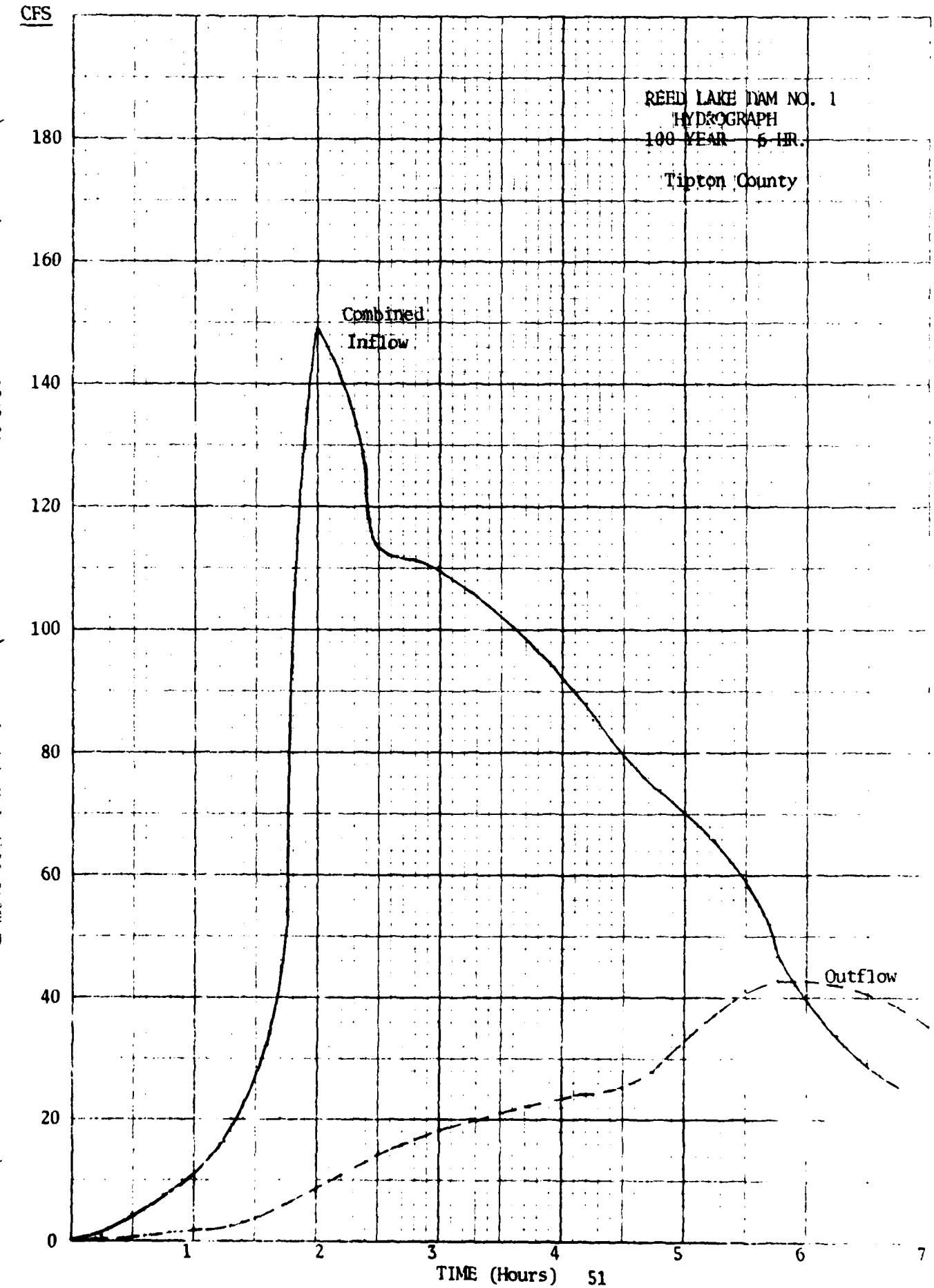
(Q/q_p) = 1679.13 CFS.

t(COLUMN) = (t / T_p) REV. T_p q(COLUMN) = $(q_c / q_p)(Q/q_p)$

Q(COLUMN) = $(Q_t / Q)Q$

	t=(t/T_p)Rev. T_p	q=(q_c/q_p)(Q/q_p)	Q_t=(Q_t/Q)Q
	t HOURS	q CFS	Q INCHES
1	0	0	0
2	.26	3	
3	.52	13	
4	.78	24	
5	1.04	34	
6	1.30	44	
7	1.56	55	
8	1.82	129	
9	2.08	297	
10	2.34	170	
11	2.60	97	
12	2.86	74	
13	3.12	60	
14	3.38	50	
15	3.64	45	
16	3.90	40	
17	4.16	37	
18	4.42	34	
19	4.68	30	
20	4.94	29	
21	5.20	29	
22	5.46	29	
23	5.72	7	
24	5.98	3	
25	6.24	0	
26			
27	Check: (1333) (.26)		= 13.4"
28	645 (.04)		
29			
30			
31			
32			
33			
34			

Winsett-Simmonds-Considine & Associates, Inc.
821 SOUTH BARKSDALE STREET P O BOX [illegible] MEMPHIS, TENNESSEE 38104
TELEPHONE 901 [illegible]
Systems Engineers


CFS
REED LAKE DAM NO. 1
HYDROGRAPH
100 YEAR 6 HR.
Tipton County
Combined
Inflow
Outflow
180
160
140
120
100
80
60
40
20
0
1
2
3
4
5
6
7
TIME (Hours)

NAME OF DAM =REED LAKE #1

STORM=100 YEAR-6 HOURS- AMC III
TIME INCREMENT IN HOURS = 0.25

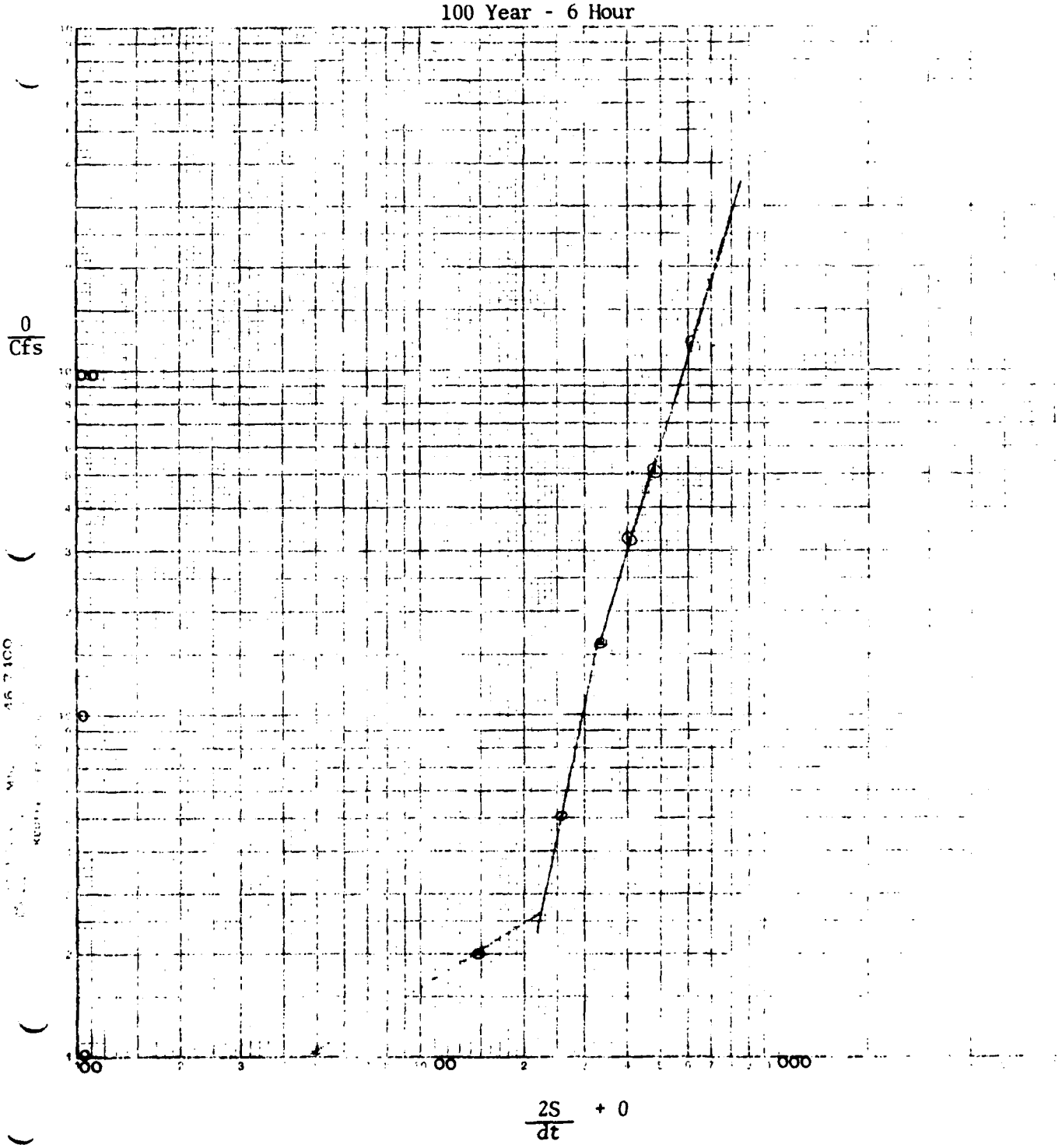
TIME	I (CFS)	2S/DT-O	2S/DT+O	O(CFS)
0.00	0.00	0.00	0.00	0.00
0.25	1.00	0.49	1.00	0.25
0.50	4.10	4.16	5.59	0.71
0.75	7.30	12.93	15.55	1.32
1.00	10.73	26.99	30.95	1.99
1.25	16.30	48.47	54.03	2.77
1.50	28.71	85.78	93.43	3.83
1.75	54.32	157.83	168.81	5.49
2.00	149.04	343.89	361.19	8.65
2.25	137.65	606.42	630.53	12.06
2.50	113.46	828.49	857.53	14.52
2.75	111.50	1020.65	1053.50	16.42
3.00	110.21	1206.15	1242.41	18.13
3.25	106.58	1383.61	1422.94	19.66
3.50	104.82	1550.93	1593.01	21.04

3.75	97.43	1706.65	1751.13	22.27
4.00	91.65	1849.03	1895.73	23.35
4.25	85.41	1977.49	2026.09	24.30
4.50	79.33	2091.99	2142.23	25.12
4.75	74.37	2189.79	2245.69	27.95
5.00	70.10	2268.06	2334.25	33.10
5.25	65.49	2328.40	2403.63	37.62
5.50	59.15	2370.79	2453.04	41.12
5.75	46.59	2390.79	2476.53	42.87
6.00	40.18	2391.65	2477.56	43.95
6.25	34.00	2381.76	2465.91	43.31
6.50	29.49	2364.21	2445.33	43.58
6.75	25.23	2341.57	2418.93	43.43
7.00	0.00	2296.47	2366.83	35.17

****

REED LAKE DAM NO. 1

100 Year - 6 Hour



Note: dt = 0.25 hrs. (Used for 100 year storm only.)

```
**************************
POWER CURVE FIT EQUATION
**************************

 PROJECT = REED LAKE #1

 Y=A*X^B

 A = 0.254494654

 B = 5.98758E-01

 COEF. OF DETERMINATION= 1.000

*******************************

 PROJECT = REED LAKE #1, 2ND EQUATION

 Y=A*X^B

 A = 6.19146E-14

 B = 4.37274E+00

 COEF. OF DETERMINATION= 1.000

*************************

 PROJECT = REED LAKE #1, 3RD. EQUATION

 Y=A*X^B

 A = 2.83457E-10

 B = 3.93793E+00

 COEF. OF DETERMINATION= 0.996

*************************
```

100 YEAR - 6-HOURS AMC III

HYDROGRAPH COMPUTATION

DATE May 8, 1981
COMPUTED BY BFS
CHECKED BY

Project Reed Lake Dam No. 1

DR. AREA 0.04 SQ. MI. STRUCTURE CLASS _____

T_c 0.25 HR. STORM DURATION 6 HR.

POINT RAINFALL 5.5 IN.

ADJUSTED RAINFALL:

AREAL FACTOR _____ IN. _____

DURATION FACTOR _____ IN. _____

RUNOFF CURVE NO. 91

Q 4.47 IN.

HYDROGRAPH FAMILY NO. 1

COMPUTED T_p .175 HR.

T_o 5.48 HR.

(T_o / T_p)

COMPUTED 31.31 ; USED 36

REVISED T_p .152

$q_p = \frac{484A}{REV.\ T_p} = 127.37$ CFS.

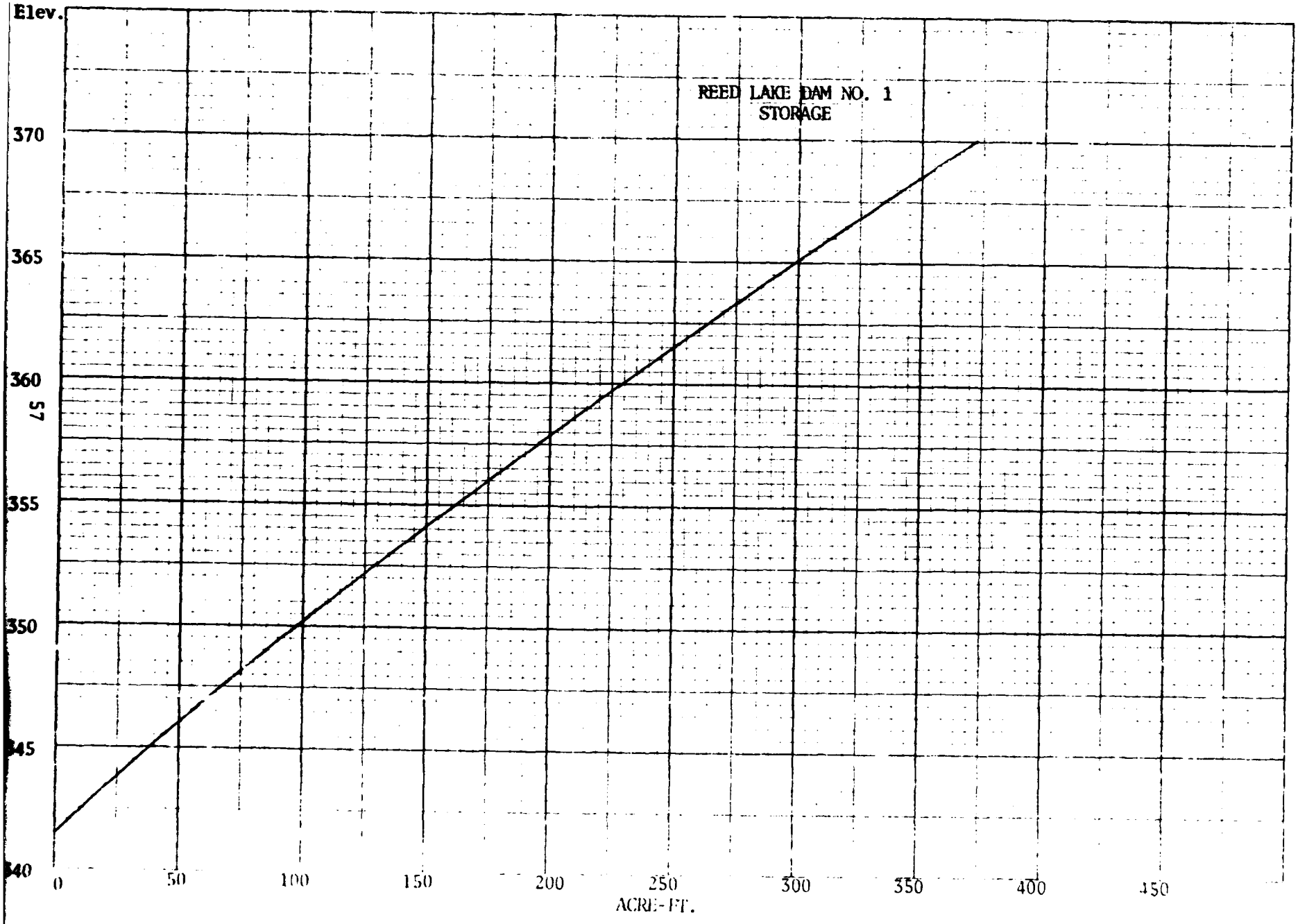
$(Q*q_p)$ = 569.34 CFS.

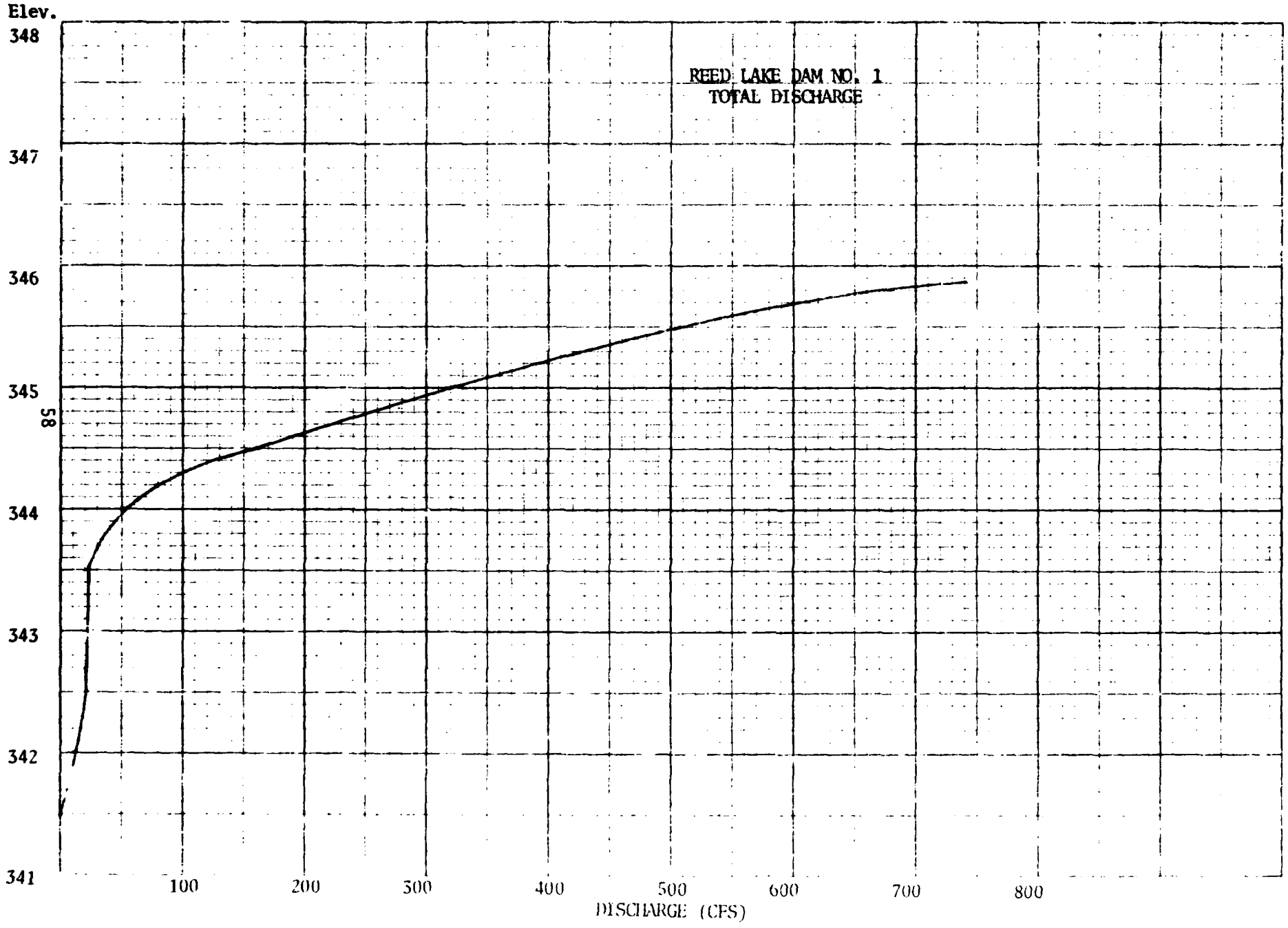
t(COLUMN) = (t / T_p) REV. T_p q(COLUMN) = $(q_c / q_p)(Q*q_p)$

Q(COLUMN) = $(Q_t / Q)Q$

	t = (t/Tp) Rev. Tp	q = (qc/qu)(Q*qp)	Qt = (Qt/Q)Q
	t HOURS	q CFS	Q INCHES
1	0	0	0
2	.26	1	
3	.52	5	
4	.78	8	
5	1.03	11	
6	1.29	15	
7	1.55	19	
8	1.81	44	
9	2.07	101	
10	2.33	58	
11	2.58	33	
12	2.84	25	
13	3.10	20	
14	3.36	17	
15	3.62	15	
16	3.88	14	
17	4.13	13	
18	4.39	11	
19	4.65	10	
20	4.91	10	
21	5.17	10	
22	5.43	10	
23	5.68	2	
24	5.94	1	
25	6.20	0	
26			
27			
28	Check = (.26) (453) / 645 (.04)		= 4.57"
29			
30			
31			
32			
33			
34			

Wilsen-Simmonds, Considine & Associates, Inc.
621 SOUTH BARKSDALE STREET P O BOX [illegible] MEMPHIS, TENNESSEE 38104
TELEPHONE 901 [illegible]
Systems Engineers




Elev.
348
347
346
345
344
343
342
341
REED LAKE DAM NO. 1
TOTAL DISCHARGE
100
200
300
400
500
600
700
800
DISCHARGE (CFS)

APPENDIX F

DAM INVENTORY DATA SHEET

DAM INVENTORY DATA SHEET
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

ID NUMBERS STATE(ID): 84-7006 FEDERAL(FED ID): TN-16706
NAME(PROJECT): Reed Lake Dam #1 REGION(R): West
OWNER(S): Paul Wayne Reed
ADDRESS: 4890 Second St., Millington, TN 38053
TELEPHONE RESIDENCE: 872-4814 BUSINESS:
COUNTY: Tipton QUAD: 408NE-Munford
LOCATION LATITUDE: 35 ° 24 ' 25 ", LONGITUDE: 89 ° 51 '- 45 "
STREAM(SOURCE): Trib North Fork Creek RIVER MILE: BASIN: 43
PURPOSE OF DAM: Recreation YEAR COMPLETE: 1948
CONTRACTOR(CONT): LOCATION:
ENGINEER(ENG): SCS LOCATION: Covington
TYPE OF DAM(TYC): Earth SIZE CLASSIFICATION: Small
DOWNSTREAM HAZARD POTENTIAL CLASSIFICATION STATE(H) 1 FEDERAL(FH) High
CERTIFICATE EXPIRATION DATE(EXP DATE):
STRUCTURAL HEIGHT(SHT): 16.5 FEET, HYDRAULIC HEIGHT(HHT): 13.5 FEET
CREST LENGTH(LGTH): 530 FEET, CREST WIDTH(WDTH): 14 FEET
UPSTREAM SLOPE(U/S): 2 :1, DOWNSTREAM SLOPE (D/S): 3 :1
POOL AREA NORMAL(NSURF): 10.1 ACRES, MAXIMUM(M/SURF): 11.07 ACRES

	ELEVATION(FEET MSL),	STORAGE CAPACITY(ACRE-FEET)
TOP OF DAM	(ELEV1) 344.5 ,	(TO/STR) 70
EMERGENCY SPILLWAY CREST	(ELEV2) 343.5 ,	(EM/STR) 59
NORMAL POOL	(ELEV3) 341.5 ,	(N/STR) 37

EMERGENCY SPILLWAY MATERIAL(ESM) Earth , SIZE(SZ) 33' W
SERVICE SPILLWAY MATERIAL(SSM) Conc , SIZE(SZ) 2.1' x 2.7'
DRAINAGE AREA(DA): .19 SQ. MILES, CURVE NUMBER(CN): 79 AMCII
TIME OF CONCENTRATION(TC): .25 HOURS, MAXIMUM 6-HR RAIN: 29.5 INCHES
COMMENTS: INVENTORIED BY: Privett DATE: 7/14/81
REVISED BY: DATE: D/S HAZARD BY: Moore DATE:
OTHER NAME OF PROJECT: POOL AREAS OBTAINED BY: Quad
OTHER CONTACT AT DAM: PHONE:
DATA OBTAINED FROM: Phase I inspection
EMER. SPIL. DESC.: A natural draw with a bottom width of 3.3'
SERV. SPIL. DESC.: Concrete riser with inside dimensions of 2.1' x 2.7'
ELEVATIONS REF. TO: Normal pool elevation APPROX ELEV: 341.5 FT MSL
DRAWDOWN DRAIN: MATERIAL: None SIZE: ELEVATION:
OTHER COMMENTS:

84-6

TENNESSEE DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES
2611 West End Avenue
Nashville, Tennessee 37203
Telephone (615) 741-2572

2 1-6-78

Dam # _____

INVENTORY DATA ON IMPOUNDMENT

Quad # 408-NE 7

Name of Dam Reed's Lake #1

Name of Owner ~~B.L.~~ PAUL WAYNE Reed

Address 4890 SECOND ST, ~~4786 Bailey~~, Millington, Tenn. 38053 Tel. 872-4814

County Tipton Stream Trib., North Fork Creek (43)

Dam at Stream, Lat. 35° 24' 25", Long. 89° 51' 45"

Type of Dam Earth Purposes Recreation

Downstream Hazard Category, (D/S HAZ), 1 GALLOWAY 5-19-80

Type of Spillway _____

Length of Crest 510 Ft., ~~Length~~ Width of Spillway ~~100~~ 135 Ft.

Hydraulic Cap. of all Spillways _____ cfs _____ cfs-sm

Spillway Lip Elev. _____ Ft. (MSL), Pool Area 12 Ac.

Volume in Dam 6567 Cu. Yds., Drainage Area 100 Ac.

Max. Vol. Pool ~~82~~ 131 Ac. Ft., ~~Min.~~ Normal Vol. Pool 58 (1) Ac. Ft.

Structural Ht. Dam 17 Ft. Hydraulic Ht. Dam 12 Ft.

Engineered by SCS

Construction by _____

Year Completed 1948, Plans, ____, At _____

Inspection by _____, Date _____

Certificate # _____, Issued on _____, Expires _____

Comments (1) Estimated by 0.4 factor

June 21, 1973 61

APPENDIX G

HAZARD POTENTIAL

AND

CONDITION CLASSIFICATION DEFINITIONS

DEPARTMENT OF THE ARMY

OFFICE OF THE CHIEF OF ENGINEERS

HAZARD POTENTIAL CLASSIFICATION*

Category	Loss of Life	Economic Loss
Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)
Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than few	Excessive (Extensive community, industry or agriculture)

*U.S. Army Corps of Engineers, Recommended Guidelines for Safety Inspection of Dams.

TENNESSEE DEPARTMENT OF CONSERVATION

DIVISION OF WATER RESOURCES

DAMAGE POTENTIAL CATEGORY*

Category	Description
1.	Dams located where failure would probably result in any of the following: loss of human life; excessive economic loss due to damage of downstream properties; excessive economic loss, public damage to roads or any public or private utilities.
2.	Dams located in predominantly rural or agricultural areas where failure may damage downstream private or public property but such damage would be relatively minor and within the general financial capabilities of the dam owner. Public hazard or inconvenience due to loss of roads or any public or private utilities would be minor and of short duration. Chances of loss of human life would be possible but remote.
3.	Dams located in rural or agricultural areas where failure may damage farm buildings or agricultural land but such damage would be more or less confined to the dam owner's property. No loss of human life would be expected.

* Tennessee Department of Conservation, Division of Water Resources, Rules and Regulations Applied to the Safe Dams Act of 1973. Chapter 0400-4-1.

DEFINITION OF CONDITION CLASSIFICATION

"Unsafe - Emergency" - A dam in a state of imminent failure. State and local authorities and downstream residents should be advised immediately, reservoir drained, or combination of the above (e.g., advanced piping, major slope instability, recent sudden collapse of a portion of the foundation, imminent overtopping, etc.).

"Unsafe - Nonemergency" - A dam with obviously serious deficiencies which clearly could develop, or are developing, into failure modes but do not yet pose the threat of imminent failure. State and local authorities should be advised promptly and remedial work should begin as soon as practical. Someone should be assigned to periodically check on the dam's condition until remedial work is begun. Drawing down the reservoir should be considered, e.g., flowing seepage from embankment which could lead to piping, evidence of solution channels or cavitation in the foundation, seriously inadequate spillway capacity as per ETL 1110-2-234, history of recurring slope instability, etc.).

"Significantly Deficient" - A dam with deficiencies which, if left unchecked, would likely become serious deficiencies and could ultimately result in failure. Advise State authorities and recommend remedial work be scheduled in time to prevent substantial further deterioration of the condition(s)--usually within six months to a year or sooner (e.g., heavy growth of sizeable trees on slopes, potentially serious erosion, spillway discharge channel too close to embankment, etc.).

"Deficient" - A dam with deficiencies which need attention but which would not likely effect the safety of the dam unless left unchecked for a long period of time. Advise State authorities and recommend remedial action at owner's convenience but before the problem can escalate into a significant deficiency (e.g., brush and/or few or very small trees on embankment, long term deterioration of masonry or metal outlet features, formation of deep ruts in embankment roadway, deterioration of riprap, etc.).

"Not Deficient" - Well constructed and maintained dam with no apparent deficiencies relative to its safety and structural integrity.

APPENDIX H

CORRESPONDENCE

NON-FEDERAL DAM INSPECTION REVIEW BOARD
PO BOX 1070
NASHVILLE, TENNESSEE 37202

ORNED-G

Commander
US Army Engineer District, Nashville
PO Box 1070
Nashville, TN 37202

1. The Interagency Review Board, appointed by your Memorandum of 8 October 1981, presents the following after meeting on 2 June 1981 to consider the Phase I investigation report on Reed Lake Dam No. 1 performed by Wilsett-Simmonds, Consterdine & Associates, Inc., under contract to the Tennessee Department of Conservation.

2. The spillway should be described as a "seriously inadequate spillway."

3. The conclusions should state that there is evidence of slope instability.

4. The condition classification should be changed from "significantly deficient" to "unsafe-nonemergency."

5. An emergency action plan should be developed, including a warning system to alert downstream residents, in the event a serious condition develops with the project.

6. The Board considered the information contained in the report and agreed with the conclusions and recommendations following minor revisions.

FRANK B. COUCH, JR.
Chief, Geotechnical Branch
Chairman

JAMES GUNNELS
Structural Engineer
Alternate, Design Branch

ROBERT A. HUNT
Director, Div of Water Resources
State of Tennessee

THOMAS N. PORTER
Hydraulic Engineer
Alternate, Hydrology & Hydraulics Branch

EDWARD B. BOYD
Hydrologic Technician
Alternate, US Geological Survey

O'GENE W. BARKEMEYER
State Conservation Engineer
Soil Conservation Service

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

IN REPLY REFER TO

ORNED-G

9 JUN 1981

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

Please be informed of the results of an inspection, under authority of Public Law 92-367, conducted on Reed Lake Dam No. 1 in Tipton County, Tennessee. An inspection team, composed of personnel from Winnsett-Simmonds, Consterdine and Associates, Inc., and a member of your Division of Water Resources, observed conditions which indicate a high potential for failure of the embankment dam due to seriously inadequate spillway capacity and other serious deficiencies.

Reed Lake Dam No. 1 is classified as a high hazard potential, small size dam and, as such, should be able to regulate a one-half probable maximum flood (1/2 PMF) to conform to inspection program guidelines. A hydraulic analysis of the project's spillway showed the dam would be substantially overtopped by a one-half probable maximum flood. A visible inspection indicated that the stability of the upstream slope is questionable due to wave erosion and sloughing, undesirable growth on the downstream slope, and seepage at the toe of the dam.

Based on the results of the visual inspection and due to the seriously inadequate spillway capacity, the dam is considered unsafe. While I do not view this as an emergency at this time, I recommend you initiate prompt action by the State to cause the owner to correct the deficiencies as soon as practical to minimize the risk to the trailer park located downstream.

A report of the technical investigation will be furnished your office upon completion.

Sincerely,

LEE W. TUCKER
Colonel, Corps of Engineers
Commander

CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220


DATE
ILME